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FOREWORD

THE clinics in this volume have been contributed by fellows of the Pacific Coast Surgical Association. This association is composed of surgeons living in California, Oregon, Washington, British Columbia, and Hawaii.

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Secretary.

SAN FRANCISCO, CALIFORNIA.

CLINIC OF DR. REXWALD BROWN

COTTAGE HOSPITAL, SANTA BARBARA, CALIFORNIA

TRAUMATIC EMPHYSEMA

CLINICAL pictures similar to this arrest attention. This young man aged twenty-two was injured in an auto accident at 7 o'clock this morning. *x*-Ray examination at the hospital reveals fractures of the fifth, sixth, and seventh ribs on the right side in the posterior axillary line. The right lung is evenly collapsed about 3 cm. and there is mottling over the entire thorax due to air in soft tissues. There is no penetrating wound. It is now 10 o'clock and emphysema, which appeared first in the right chest subcutaneous tissues, has extended very largely over the entire body until the patient's normal proportions and appearance are obliterated. Distention of tissues with air is extreme. It reaches from head to feet. The air is not only subcutaneous, it is also interstitial, that is, above and below deep and superficial fascia planes. The patient looks like a distorted balloon. Touching his body anywhere elicits marked crackling.

This patient's condition grows worse under our eyes. He is cyanotic, dyspneic, and apparently suffering great pain which morphine does not relieve. We know there are fractured ribs and also a pneumothorax. It is reasonable to assume that a rib has punctured air vesicles in the lung, that a ball valve passage way extends from the lung into the superficial tissues and air is being pumped in accordance with the well-known laws of pleural physiology and physics into skin and tissue planes. The spreading emphysema and not the pneumothorax is immediately placing the young man's life in jeopardy and must be managed without delay.

Acting upon the aforesaid assumption incisions through the skin and fascia are made down to the fractured ribs. Air bubbles are now seen escaping from the cuts. The patient's general condition shows immediate change for the better. Wounds are packed and it is believed that though the ball valve action may persist for a time the air will no longer be forced into the tissues.[1]

[1] The patient made an excellent recovery and left the hospital in a week. The pleural shock produced by the sudden pneumothorax was combated by the production of negative pressure in the pleural cavity two or three times. By the end of the week there was no pneumothorax.

TRAUMATIC MYOSITIS ABDOMINALIS—SUBPHRENIC ABSCESS

THIS patient has been under my observation for two and a half months. He was referred from the service of Dr. W. D. Sansum with whom I had consulted concerning the diagnosis. We agreed there was a surgical belly which should be explored. This was done without revealing any pathology other than a marked extensive edema in the aponeuroses converging to form the sheath of the right rectus. There was no intra-abdominal infection.

This exploration occurred two weeks after the patient's entrance to the hospital. He is sixty-five years of age and an intensive clinical and laboratory study had been made of his condition which daily grew worse. His main complaint was pain in the neighborhood of the right hip referred down leg for three or more months past. There was an irregularly high temperature with a white count around 30,000. In the tissues above the crest of the right ilium redness and swelling had developed. With increasing swelling the redness had turned to a cyanotic appearance. Pressure pitting was present. The abdomen became distended and tympanitic. Intestines were sluggish. On palpation, there was a sense of a mass. Impressions were appendiceal abscess, perinephritic abscess, perforation, carcinoma ileocecal area.

After the exploratory the patient's condition grew more alarming. The temperature and white count remained high. After a week the abdominal wound broke down and discharged pus. The right inguinal glands became swollen. There continued to be a tender indurated edematous area above iliac crest. Repeated roentgenograms were taken of hip and pelvis without gaining information. A week later the right diaphragm shadow was reported displaced upward. This was more evident the following week. Concensus of opinion was subphrenic

abscess and possibly empyema. A subphrenic abscess was opened and drained transpleurally after a rib resection.

A week later an inguinal abscess was incised and today we are opening a new abscess below Poupart's ligament. A large, long sinus is found leading upward on the inside of the right iliac crest into the retroperitoneal spaces.[1]

[1] **Continuance of Clinical Record.**—Shortly after subphrenic abscess was opened resurvey of history elicited information that a coffin had fallen against patient's side above his hip when he had been a pall-bearer some months previously. He had required rest and hot applications for several days. In light of subsequent history and findings it is reasonable to assume there was a hematoma in the lateral abdominal muscles above the ilium. After a considerable period of time the hematoma became infected. A rich suprailiac lymphatic anastomosis carried the infection to the other parts involved.

The patient is still in the hospital, now five months. He is improving steadily and is able to walk. For a period after finding the sinus above iliac crest it was possible to pass antiseptic fluid by syringe through wound below Poupart's ligament and have it reappear through incision over ribs—a channel through retroperitoneal space.

SPONTANEOUS RUPTURE OF RENAL PELVIS

THIS patient, aged forty-six, has been in the hospital for ten days with a draining sinus in his right shoulder area. The history relates the occurrence of ill-defined aching pains in his left lumbar region for many years with well-defined remembrance of three attacks of severe colicky pains lasting a few days each—one eight years ago, one five years ago, and one three weeks

Fig. 376.—Rupture of renal pelvis.

ago. A few days ago while in hospital there was an attack in the same location and of the same severity. Patient was referred to our service. He states that during this last attack he felt something give way and pain was relieved. A fluctuating swelling appeared in left flank within two days from which my associate, Dr. Irving Wills, aspirated 14 ounces of thin, cloudy

fluid. Dr. Wills on cystoscopic examination found a reddened edematous left ureteral opening. A ureteral catheter encountered obstruction 6 cm. above the bladder. *x*-Ray pictures showed opacities above pelvic brim, and a large vague shadow in kidney region. Ureterograms showed well-filled ureter up to but not beyond the opacities. Phthalein estimation on right side was 50 per cent total—left, 0 per cent.

Dr. Wills is now commencing to explore the upper left urinary tract of this man. You will note the tissues through which he cuts are very edematous. The usual fatty capsule about the kidney is replaced by a thick, friable structure which fluctuates. This structure being opened permits the escape of about a quart of slightly cloudy fluid. As Dr. Wills enlarges the opening you see a large cavity in which the kidney lies. Now, on closer examination, observe the rare sight of a rent 2 to 3 cm. long in the posterior wall of the renal pelvis. This rent you hear Dr. Wills say explains the recent colic, the sensation of something giving way, the relief of pain and the rapid swelling in the flank. I am sure his analysis is correct.[1]

Follow the completion of the operation. An intracapsular nephrectomy is done because of the friable edematous pedicle. The capsule is folded over the pedicle to lessen possibility of secondary hemorrhage. The opacities as shown by the *x*-ray are seen to be two large stones in the ureter above the pelvic brim. The incision is lengthened and the stones removed, leaving the ureter which is friable and adherent.

[1] The patient made an excellent recovery. Subsequent remarks made by Dr. Wills were that spontaneous rupture of the renal pelvis is a pathologic curiosity. Distended kidneys due to partial or complete obstructions of the ureter are not uncommon, but ruptures do not occur independent of some trauma. Trauma was not a factor in this case. Kidney secretion must have continued despite obstruction by the stones and hydraulic pressure became great enough to break the renal pelvic structures. Usually due to a block the reverse pressure through the ureter stops kidney secretion inducing anuria.

SODIUM AMYTAL INDUCTION ANESTHESIA

You have probably noticed the satisfying anesthesia used on this patient. My surgical associates, Drs. Wills, Eder, Atsatt, and Bakewell, and I have used the new drug, sodium amytal, as an induction anesthesia in 164 cases as enumerated on this chart.

SODIUM AMYTAL AS INDUCTION ANESTHESIA USED IN 164 OPERATIONS

From files of the Santa Barbara Clinic

Thyroidectomy	6	Ectopic pregnancy	1
Breast amputation	6	Cesarean section	1
Cholecystotomy	4	Fractures open reduction	3
Cholecystectomy	10	Nephrectomy	4
Gastro-enterostomy	3	Uretero-lithotomy	1
Gastrostomy	2	Uretero-plasty	1
Perforation ulcer pylorus	1	Resection bladder tumor	2
Iliostomy	1	Prostatectomy	9
Appendectomy	13	Rib resection subphrenic abscess	1
Bowel obstruction	3	Amputation, leg—thigh	5
Resection sigmoid	1	Miscellaneous	31
Colostomy	4	Tuberculous peritonitis	
Hemorrhoidectomy	6	Brain tumor	
Hernioplasty	8	Kondolion operation	
Hysterectomy	13	Skin graft	
Salpingectomy	7	Inoperable after exploration	
Removal ovarian cyst	2	Cystoscopies, etc.	
Perineorrhaphy suspension uterus	15	Total cases	164

Our impressions of sodium amytal as an adjunct to anesthesia are:

1. The outstanding contribution of modern times to betterment and safety of anesthesia.
   Credit and honor due to Dr. L. G. Zerfas of Indianapolis City Hospital.
2. It eliminates fear of smothering and strangling incident to inhalation anesthesia.
   Sleep comes quickly, quietly to patient in his own bed. Psyche is protected.

3. It is not dangerous if no effort is made to produce complete surgical anesthesia.

   When patient reaches operating room, supplementary anesthesia should be used.

4. Less secondary anesthesia is required. Most patients can be carried on nitrous oxide.
5. Postanesthetic phenomena are pleasing.
   (1) More or less continuous sleep.
   (2) When fully awake little memory of episodes following operation.
   (3) Greatly lessened or absent nausea and vomiting.
   (4) Less pain—easy to administer fluids by vein and under skin.
   (5) Lessened gas pains.
6. Fall in blood pressure which almost invariably occurs following intravenous injection is restored to normal in from fifteen to thirty minutes. Fall not disturbing if sodium amytal is used only to depress nervous system to level for supplementary anesthesia.

CLINIC OF DR. SAMUEL L. CALDBICK

EVERETT CLINIC, EVERETT, WASHINGTON

SUBCLAVIAN ANEURYSM

ON the evening of October 8, 1929, O. J., a young man of twenty years, 6 feet, 2 inches tall, weighing 200 pounds, was brought to the Everett General Hospital, after having accidentally shot himself, a .38 bullet entering his right shoulder.

He was in profound shock, almost pulseless, his clothes saturated with blood. Examination revealed a wound ½ inch below the middle third of the right clavicle, with the bullet lodged under the skin just above the inner portion of the spine of the scapula. Bleeding had entirely ceased. No pulse could be felt in the right radial and axillary artery, but a thready rapid pulse was felt in the left radial. There was no further evidence of injury to any important structure.

The young man made a rapid recovery from his shock and loss of blood. Three days later, a weak pulse could be felt in the right radial artery. At the end of twelve days, a bruit could be heard over the outer portion of the right subclavian artery. There had been no damage except to the subclavian vessels.

For the next three months he reported regularly at my office and I was enabled to watch the gradual development of his aneurysm.

On January 7, 1930, he re-entered the hospital and his condition on admission was as follows: A healthy, vigorous young man whose complaint is "a swishing noise in the region of his healed bullet wound, 'under right collar bone' " with a pulsating mass in this area. There is loss of strength of the right hand and fear to use that arm because of the tumor; coldness and

blueness of the right hand, which, when hanging down for long, feels numb. Examination at this time reveals under middle third of the right clavicle a tumor the size of a lemon, which pulsates and on closer inspection is found to pulsate synchronously with the cardiac systole. The tumor is perfectly round and smooth, and attached to the middle third, or at the junction with the middle and outer third of the subclavian artery. The pulse of the right wrist is perceptible, but very weak. The blood pressure reading of the two sides is 110/96 on the right and 132/75 on the left.

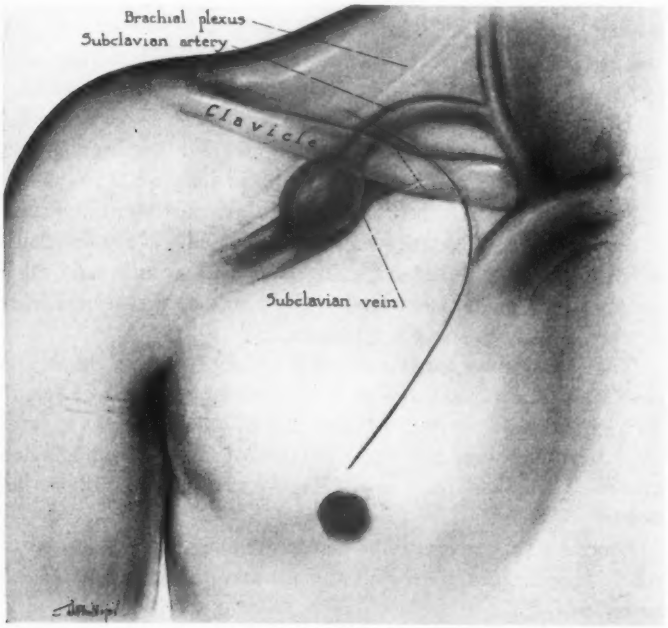

Fig. 377.—Showing the skin incision and location of the aneurysm. Dotted line indicates where the clavicle was cut.

Operation (January 9, 1930): A long curved incision is made through the skin from the lower border of the clavicle to the sternum, then downward and outward over the pectoralis major

muscle to just above the right nipple. The muscles, sternocleidomastoid above and pectoralis major below, are separated from the clavicle. The clavicle is divided near its articulation, using a Gigli saw. The clavicle is then drawn downward and backward, excising the attachment of the subclavius as needed. Then the thin sheet of the pectoralis minor which covers the pulsating tumor is divided and retracted. Careful dissection soon brings

Fig. 378.—Exposure of the aneurysm.

into view the large subclavian vein in its bed beneath the artery. The aneurysm is then freed of the firmly adherent connective tissue and the subclavian artery exposed. A No. 12 soft-rubber catheter is put around the vessel, one above and one below the aneurysm, and held by an assistant so that it can be compressed at will. The aneurysm is next attacked. The sac is opened and found to be springing from the artery at the junction of the outer and middle third and by a large opening.

A single row of fine silk sutures outward closes the mouth. The aneurysm is excised and closure of the opening further strengthened by two layers of chromic catgut No. 00.

Fig. 379.—Method of closing the mouth of the sac.

Fig. 380.—Artery closed with a continuous suture. The compressed vein has fallen into place.

The vessel is released and as there is no hemorrhage the wound is closed. It is evident that collateral circulation had

been well established as the color of the fingers remained unchanged when the artery was completely compressed.

The muscles are sutured to their attachments on the clavicle and the clavicle in turn is immobilized by kangaroo tendons

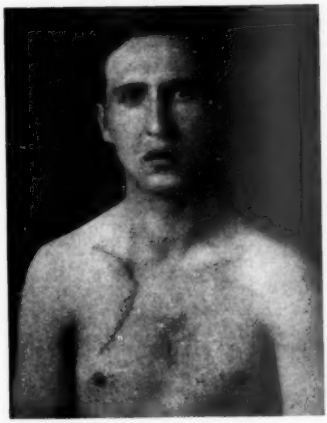

Fig. 381.—Photograph of the patient two months after operation.

threaded through gimlet holes in both fragments and then tied. The skin is sutured.

There was very little shock following the operation, though the pulse remained rapid for four days. The wound healed well and the patient became ambulatory on the tenth day.

CLINIC OF DRS. SAMUEL L. CALDBICK AND RACHEL E. HOFFSTADT

EVERETT CLINIC, EVERETT, WASHINGTON

A CASE OF FRACTURE FOLLOWED BY GANGRENE CAUSED BY CLOSTRIDIUM FALLAX

DURING the World War gas gangrene was common in gunshot wounds and fractures. In civil practice a comparatively few cases have been reported. These are often introduced by fracture and usually are the result of infection by anaerobes found in the gastro-intestinal tract.

Up to 1915, 175 cases had been reported; 35 per cent were from compound fracture, 16 per cent from lacerated wounds, and the rest in about equal proportions from postoperative wound, gunshot wound, and hypodermic punctures.

In 1922[1] Barney and Heller reported a case of compound fracture of an arm of a girl of eight in which amputation was necessary. From this they isolated Cl. welchii, vibrion septique, and Bacillus S.

In 1924 Goodman[2] reported a case of crushed thigh from which Cl. welchii was isolated. In the same year Monroe[3] reported 3 cases caused by the same organism. In 1925 St. Fortune[4] reported 3 cases of fracture, but did not name the organism.

History of Case.—J. O., a white male, sixteen years old, in good health, was brought into the emergency room at the Everett General Hospital, January 24, 1929, after sustaining a dislocation of the right hip and a compound comminuted fracture with a complete posterior dislocation of the right ankle. Under ether anesthesia the dislocations were reduced and the injured ankle was irrigated and put up in a "pillow and sides" splint. The wounds were not closed. He was returned to bed in good

condition. The following day the foot was badly discolored and there was a large amount of serogangrenous discharge. At the end of forty-eight hours, gangrene was definitely established and amputation in the middle third of the leg was performed. Following the operation he complained of pain out of all proportion to the apparent seriousness of the injury and there was a profuse, dirty, foul-smelling serous discharge from the wound within a few hours after the amputation was performed. The second night after the operation the nurse, while engaged in changing the dressing, detected crepitation in the tissues. By

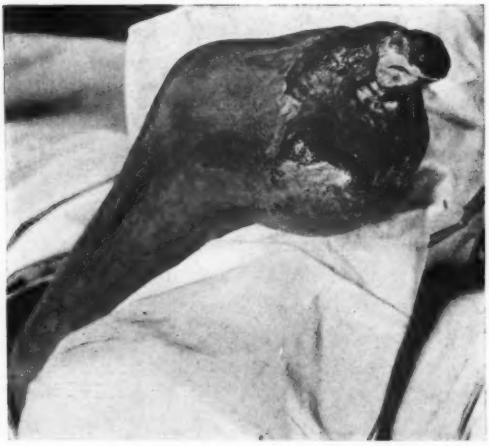

Fig. 382.—Showing retraction of soft structures and healed scars which were made for drainage.

morning this had extended well above the knee along the course of the great vessels and the leg was swollen to twice its normal size. The patient's temperature was 104.4 F., pulse was 160, respiration 38. All sutures were at once removed, and the leg incised deeply in eight places. Dakin tubes were laid loosely in the incisions and irrigation with quino-formalin solution carried out every two hours. The patient was given 500 cc. of citrated whole blood on each of the following two days. Culture of the seropus from the wound showed large amounts of gas in anaerobic

cultures. Under this treatment, his condition gradually improved and after twelve days cultures remained negative for anaerobes at the end of ninety-six hours. He was discharged March 19, 1929, with a granulating stump. On May 13, 1929, he returned to the hospital and a mid-thigh amputation was performed. Following the second operation he showed a sharp rise in temperature and great prostration. All sutures were removed, irrigation with Dakin's solution started, and transfusion again resorted to. Cultures in this instance did not show the presence of any anaerobic organisms and the infection soon cleared up under treatment, with the hypochlorite solution. He left the hospital on June 3, 1929, in good condition with the stump completely healed.

Organism Isolated.—(*a*) *Characteristics of the Organism.*—Cultural characters. The exudate from the wound was planted in cooked meat medium, and after five days' incubation, the organism was isolated and purified. For identification it was planted on the following media: Liver agar stab; gelatin, cooked meat and egg cube medium, broth, brain, litmus milk, liver broth; 1 per cent lactose, levulose, maltose, sucrose, inulin, dextrin, sucrose, galactose, salicin, and mannite broths. On liver agar it produced abundant gas and a filamentous growth along the line of puncture. It did not liquefy gelatin. On cooked meat and egg medium the color of the meat was a copper red which later became pink. The fluid was clear. There was no reduction of the particles of the meat. An abundant gas was formed. On egg cube media no change was found in the egg, but the broth was turbid and gas formed. No change was found on the brain medium with the exception of gas formation. Litmus milk was reduced and after fourteen days gas was formed. Gas and acid were formed in glucose, lactose, maltose, sucrose, dextrin, levulose, and gelactose broths.

(*b*) *Morphology.*—The direct smear of the exudate showed a gram-positive rod with a subterminal spore. On the egg cube medium, meat, liver agar, and broth this same slender rod was demonstrated. It occurred singly, never in chains. The ends were rounded. There was no capsule observed. The spores

formed in meat after three weeks, and broth and liver agar after ten days, were subterminal and were not wider than the rod. During sporulation the rod stained faintly. It was slightly motile. The organism was not pathogenic to either guinea-pig or rabbit.

The organism agrees with *Cl. fallax* as described by Ford[5] with the exception of the fact that it did not clot milk.

Clostridium fallax is considered by Goodman[2] as ranking second in importance in the production of gas gangrene in civil practice. It was found in 12 per cent of war wounds.

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CLINIC OF DR. ARTHUR B. CECIL

FROM THE HOSPITAL OF THE GOOD SAMARITAN AND GOOD HOPE HOSPITAL FOUNDATION, LOS ANGELES, CALIFORNIA

ABERRANT RENAL VESSELS A CAUSE OF KIDNEY DISEASE

I WISH to present to you 3 cases in which aberrant renal vessels were demonstrated to be the cause of kidney disease.

Mayo, Eisendrath, Mathey, Ferre, and many others have pointed out that aberrant renal vessels are frequently the cause of demonstrable hydronephrosis. Two of the cases which I will present to you are this type. I would like to say a word in regard to the third case which I will present as I believe that it represents a definite group in which aberrant renal vessels are responsible for renal pain, but in which it is impossible to demonstrate hydronephrosis. I am sure that this is a much more frequent occurrence than we have heretofore considered.

The clinical picture of these obscure types of renal pain due to aberrant renal vessels is that the patient gives a history of intermittent attacks of pain usually beginning in the region of the superior lumbar triangle and radiating downward but less frequently pain of abdominal type coming on in attacks with or without urinary disturbances.

In many instances there is a history of constant discomfort between acute attacks. In other instances there is a history of constant discomfort without acute renal colic. As a rule the urine is entirely normal. It may, however, be infected. On physical examination during the attack one usually finds a tender palpable kidney. Of the group of which I am now speaking, a pyelogram does not show hydronephrosis. As a rule, the pyelogram is not entirely normal. Either the kidney seems slightly rotated or the ureter seems to come off in an abnormal

fashion, or a definite kinking or apparent stricture can be made out. In all instances the kidney is low when a roentgenogram is made in the upright position and in many instances it is low when taken in the prone position. A great many of these cases are now being treated by dilation for stricture of the ureter. Such treatment I am convinced is of no value in this group. Upon exposing such a kidney aberrant renal vessels will be found running to the lower pole. The pain in my opinion is always due to ureteral obstruction caused by these vessels in one way or another, either through pressure, kinking, or fibrous bands. I have never seen a case of renal pain associated with aberrant renal vessels to the upper pole alone.

As to the treatment of this condition, two plans have been evolved. One, to divide and transplant the ureter, the other to divide the vessels. Personally I am opposed to the first plan as it offers many possibilities for subsequent trouble, and as far as that is concerned for very immediate trouble. The idea of this operation of course being to preserve the entire blood supply of the kidney. I am not at all sure that even this would not be compensated for in the very vast majority of cases. Of course there are many possibilities such as bilateral hydronephrosis and conditions in which only very poor drainage of the kidney would result from simply blood vessel division that might call for ureteral transplantation. I hope that you will understand that these problems are outside of the group which I am considering, namely, the group in which hydronephrosis is not present.

I have frequently observed that when the aberrant renal vessels are divided, it will be found that the kidney can now be easily put in its normal position. It not only can be put there, but tends to go there and can be easily kept in this position by bringing together the renal fascia beneath it rather than by suturing through the kidney. It is my opinion that the failure to get relief following many nephropexies has been due to the failure to recognize that the nephroptosis was due to aberrant renal vessels. Naturally fixation of such a kidney high up under the ribs without the division of these vessels could not possibly bring about a cure.

CASE REPORTS

Case I.—Mrs. W. V. K., age thirty years. Married nine years, never pregnant. General health always excellent. Seven years previous to admission taken with pain in the right renal region and right lower abdomen. Pain severe enough to keep her awake at night. Pressure on the side seemed to relieve pain. Appendix and right ovary were removed which seemed to relieve the attacks of pain in the lower abdomen, but had no effect on the aching pain in the right renal region. Two years before admission, first noticed frequency of urination and for the past two weeks frequency has been more marked and associated with pain in the urethra.

Physical examination showed an extremely well-nourished woman. The findings were entirely negative except that the right kidney was palpable for about three finger breadths below the costal border. The urine showed a trace of albumen, numerous pus cells, and a colon bacillus infection which was also determined to be present in the urine from both kidneys. Differential phthalein test is expressed by the following table:

Phthalein Appeared	
Right:	*Left:*
40 minutes	4 minutes
First 15 minutes' collection	
1 cc., no phthalein	115 cc., 30 per cent phthalein
Second 15 minutes' collection	
1 cc., no phthalein	110 cc., 15 per cent phthalein

Attempts to make a right pyelogram were not successful so far as filling the renal pelvis. The ureter could be outlined, but it was abruptly shut off near the pelvis of the kidney. The diagnosis was obstruction of the ureter and exploratory operation was decided upon. Operation showed a kidney larger than normal and somewhat hydronephrotic. Running to the lower pole of the kidney and crossing the ureter was found aberrant vessel. This was adherent to the ureter and obstructed it so that from this point upward the ureter and renal pelvis were greatly dilated (Fig. 383). This vessel and fibrous bands ac-

companying it were divided. This now permitted the kidney to ascend for at least 3 inches and the urine which was dammed in the renal pelvis easily escaped through the ureter. The kidney was fastened in its new position by bringing together the renal

Fig. 383.

fascia beneath it. Patient made an uninterrupted recovery. Exactly one month later cystoscopic examination showed that the urine was being ejected from the right ureter in a forceful manner. The kidney function study is represented by the following table:

Right:	*Left:*
First 15 minutes, 5 per cent	First 15 minutes, 35 per cent
Second 15 minutes, 5 per cent	Second 15 minutes, 15 per cent

The right pyelogram showed a moderate degree of hydronephrosis (Fig. 384), but there was no difficulty in filling the renal pelvis at this time. Subsequent follow-up notes in this case show that patient has been entirely relieved of pain.

Fig. 384.

Case II.—Mr. R. A. G., aged eighteen. Two years ago wrenched his back. Six months later had an attack in which he had very severe abdominal pain, vomiting, and inability to move his bowels. About six months later he had a similar attack. For the past nine months, attacks have been very frequent. Pain is preceded by sensation of tenseness in the abdomen which is followed in a few hours by severe cramplike pain which begins in the left renal region and radiates to the anterior

abdomen. He has found that enemas and the taking of castor oil seem to give him relief. No urinary disturbances whatsoever. No fever.

Physical examination shows a fairly thin boy. General physical examination was negative except that the left kidney

Fig. 385.

was palpable. Blood was negative. Wassermann test negative. Plain *x*-ray negative. Intramuscular phthalein, seventy minute collection, 35 per cent. Differential phthalein is expressed in the following table:

Right:	*Left:*
Appeared 3 minutes	Appeared 8 minutes
First 15 minutes' collection	
10 per cent	0 per cent
Second 15 minutes' collection	
5 per cent	1 per cent

Left pyelogram showed a normal ureter as far as the fourth vertebra. From here it was a little difficult to trace until it

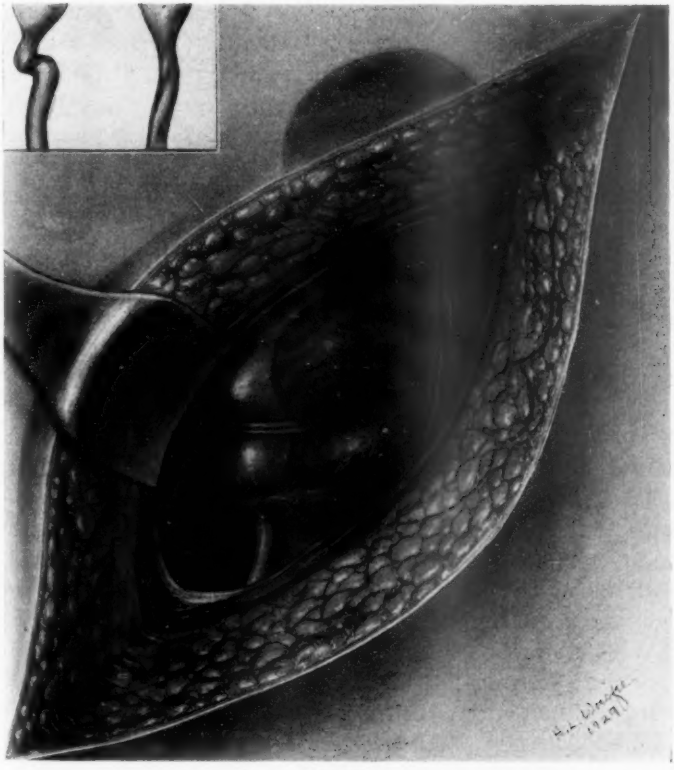

Fig. 386.

reached near the renal pelvis where it definitely showed kinking (Fig. 385). Left renal exploratory operation showed that

the left ureter was twisted and kinked about 2 inches from the renal pelvis. This was brought about by a small aberrant vessel running to the lower pole of the kidney and by a fibrous band which not only accompanied this vessel, but which held the ureter in a kinking position (Fig. 386). The vessel and fibrous band were divided. The kidney now could easily be put in its normal position. It had been definitely held down by the aberrant vessel.

Patient made an uneventful recovery. A total phthalein done approximately five weeks following this operation showed that for a period of seventy minutes a 50 per cent phthalein was excreted and for a second period of sixty minutes a 15 per cent phthalein was excreted. This was a marked contrast from the total phthalein excreted ten days previous to operation when excretion for seventy minutes was 35 per cent. One month later patient had gained 5 pounds and had no disturbances whatsoever. Subsequent follow-up notes extending over a period of one year show that this patient has remained entirely well.

Case III.—Miss A. L. S., aged thirty-six. As far back as she can remember she has suffered with abdominal pain and gas in the abdomen. Always constipated. Always been weak and tired. Extremely nervous and irritable. Sixteen years ago on account of abdominal pain an appendectomy was done. This did not give relief. Eleven years ago was operated on for prolapse of the uterus. As far back as she can remember she has had to get up about three times at night to urinate. Associated with urination is sometimes a sense of pain which seems to run from the urethra to the right side of the abdomen. No attacks of chills and fever.

Physical examination showed a rather poorly nourished young woman of quite nervous temperament. Chest and heart negative. Abdomen showed tenderness in the right upper quadrant and here the kidney could be palpated and its lower border was found to be at the brim of the pelvis. Kidney was definitely tender on palpation. Urine was negative. Gastro-intestinal and gallbladder studies were negative. Wassermann test nega-

tive. Blood was normal. A plain *x*-ray showed right kidney to be low. No stone. Cystoscopic examination showed an entirely normal bladder. A right pyelogram showed an approximately normal renal pelvis. When patient was standing, lower pole of

Fig. 387.

the kidney pelvis reached to the bony pelvis (Figs. 387, 388). On account of the tenderness of the right kidney and frequent attacks of pain in this region, an exploratory operation was decided upon.

Kidney was found to be of normal size, but was definitely held down by two vessels going straight across to the lower pole, one in front and one behind the ureter. Associated with these vessels was a fibrous band. There was no dilation of the

Fig. 388.

pelvis about this band, but it could be easily seen that they not only held the kidney in low position but they also obstructed the ureter (Fig. 389). These vessels were divided and it was noted that the kidney now was free to ascend and did so. It

was fastened in position by Kelly's method of nephropexy. This patient made an uneventful recovery with complete disappearance of pain.

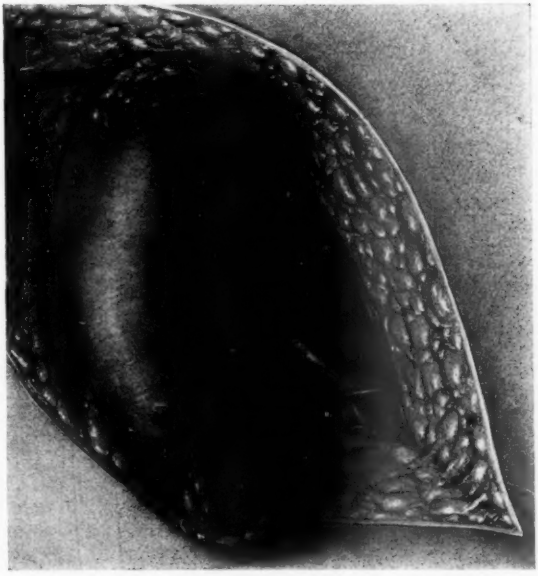

Fig. 389.

UNIV. OF MICH.

CLINIC OF DRS. WALTER C. CHIDESTER AND KIRK H. PRINDLE

MILLS MEMORIAL HOSPITAL, SAN MATEO, CALIFORNIA

TRAUMATIC RUPTURE OF THE URINARY BLADDER WITH COMPLICATING FRACTURES

WE wish to report this case, not because it is unusual, but because it represents a type which is being seen more frequently in this day of increased automobiles and highway traffic, and deserves consideration from the standpoint of immediate treatment. In so many instances, treatment of traumatic injuries is delayed, fractures are neglected, wounds do not receive the proper débridement, and internal injuries are lost sight of. These all tend to prolong shock, and should be treated as soon as possible.

This case is an American housewife, aged thirty, who was brought into the emergency ward after an automobile accident on the highway. She was disoriented, but conscious enough to complain of pain in the left thigh and pelvis. The mucous membranes were pale, the blood pressure was 90/60, the pulse 150 and weak. The left thigh was extremely angulated, and there was marked crepitation. Pressure over the hips caused extreme pain and crepitation could be felt by the maneuver. The abdomen was ridged nor could the patient relax. She complained of generalized abdominal pain also. A Thomas splint was fitted to the left lower extremity, the thigh was straightened, and traction-counter-traction applied. She was put to bed, special nurses were ordered, she was given morphine, hypodermoclysis, caffeine, and the foot of her bed elevated. She did not react well.

Ten hours after her admission the blood pressure was 85/60, the pulse was still 150 and weak, she was still semiconscious.

The blood count was 4,510,000, and the hemoglobin 80 per cent. She was still complaining of pain in her abdomen and in her pelvis. The abdomen was still ridged and there was some distention. She had not voided and was therefore catheterized and a small quantity of bloody urine obtained. Two ounces of boric acid solution was injected into the bladder without any return flow. Portable *x*-rays of the pelvis revealed a comminuted fracture of the inferior ramus of the left ischium, an impacted fracture of

Fig. 390.—Original portable *x*-rays showing anterior-posterior views of the left femur and lateral view of left femur.

the inferior ramus of the right ischium and an impacted fracture of the left portion of the sacrum. Films of the left thigh revealed a complete transverse fracture of the upper third of the femur with some comminution. Films of the skull and spine revealed no evidence of further bone injury. It was quite apparent that the patient was suffering from a ruptured bladder. Two hours later she was taken to surgery, where on opening the abdomen through midline incision bloody urine was found free in the per-

itoneal cavity. Most of it was removed by suction. The bladder was pulled up, explored, and found to contain a large rent 2 inches long in the transverse diameter at the fundus. The rent was quickly repaired with a double row of sutures. There was a marked amount of subperitoneal hemorrhage in the left pelvic wall, but since there had been no difficulty in catheterization, and since a rapid exploration of the bladder had revealed no further lacerations the wound was quickly closed with two cigaret drains. An indwelling catheter was placed in the bladder

Fig. 391.—Anterior-posterior and lateral views of left femur three months after injury.

with orders for periodic irrigations. Her condition was grave. Blood pressure was 80/40, pulse 150, and thready.

Twenty-four hours after her admission the patient was still semiconscious, pulse still 150, temperature 102.5 F., receiving hypodermoclysis and intravenous glucose. Red blood cells 3,350,000; hemoglobin, 58 per cent. Five hundred cc. of whole blood given intravenously by the Brooks tube method. The patient reacted well from her transfusion. In the next two or three

days her pulse dropped to 98, the temperature remained at about 101 F. She continued to have pain and became very restless. The Thomas splint was suspended. The bladder irrigations were continued. It was necessary to quiet her with luminal and bromide. She remained semiconscious, extremely uncooperative, and her nourishment had to be maintained by glucose and salt solutions.

Fig. 392.—Anterior-posterior view of pelvis three months after injury.

Nine days after her admission, her temperature still fluctuated between 101 and 102 F., pulse 100, blood pressure 100/60, red blood cells 2,560,000, hemoglobin 48 per cent, white blood cells 14,400. She was given another transfusion of 500 cc. of whole blood from which she reacted very well.

Two weeks after her injury her mental condition had cleared to such an extent that it was safe to apply calipers to the lower end of her femur for traction. The leg was then suspended in a Thomas splint with Pearson attachment. The calipers were

applied with the patient in bed and novocaine anesthesia. The drains were removed from the abdomen several days prior to this, and since their removal urine smelling fluid continued to drain from the abdominal sinus intermittently. At times there would be no drainage for two or three days. This intermittent drainage continued for several weeks. It was thought that perhaps the bladder sutures had given way. Sometimes when the bladder was being irrigated, the irrigating fluid would appear through the abdominal sinus.

The patient's condition at the end of seven weeks was satisfactory. The calipers were removed from the femur, *x*-rays showing excellent position of the fragments. Her mental condition had entirely cleared. The indwelling bladder catheter had been removed. The abdominal sinus continued to drain urine-smelling fluid intermittently. At times pressure against the left pelvic wall caused thick green pus to exude. The sinus was being irrigated with S. T. 37. The intermittency of the urine discharge from the abdominal sinus together with the pus from this wound caused us to consider the possibility of a spicule of bone having penetrated the bladder wall. Check-up *x*-ray of the pelvis strengthened the likelihood of this conclusion. It was feared that osteomyelitis might have developed. White blood cells 11,400, red blood cells 3,170,000, hemoglobin 64 per cent, however, did not seem to indicate it. It was decided to remove the comminuted fragments of bone from the region of the left wall of the bladder.

On February 4th, two months after the patient's accident, the abdominal sinus was opened and one or two small fragments of bone removed from the bottom of the tract. The wall of the sinus was curetted; and no apparent opening into the bladder was discovered. The sinus was packed tightly with iodoform gauze which was left in the wound for several days, and removed gradually, leaving a clean granulating surface. The drainage from the sinus ceased and the wound rapidly closed.

Three weeks later the patient was up and about receiving physiotherapy treatments to her left knee and hip. She was passing urine naturally with only slight frequency and having to

get up only once at night. The wound was practically healed and a few days later the patient was discharged from the hospital on crutches. The last check-up *x*-rays revealed abundant callus formation and good apposition of the fragments.

Four months following her injury the patient is walking without a cane and she has no limp. Pelvic examination reveals no tenderness or crepitation on bimanual examination. A cystoscopic examination reveals a normal urethra, normal bladder neck, normal trigone, and ureteric orifices. In the fundus of the bladder there is a healed scar, about $1\frac{1}{2}$ inches long in the transverse diameter. The remainder of the bladder mucosa is unchanged in appearance. The bladder capacity is 300 cc. with only slight discomfort.

Comment.—We wish to emphasize the danger in comminuted fractures of the pelvis, with rupture of the bladder, of overlooking puncture wounds due to bone spiculae. Even though they cannot be removed at the time of closure of the bladder, the possibility should be recognized in case of a persistent fistula. They may be removed extraperitoneally later. The desperate condition of the patient may limit the time for exploration. We also feel that an excellent result was obtained from the use of the Thomas splint with Pearson attachment, even though the pelvis was badly comminuted. Suspension of the pelvis or plaster was out of question because of the persistent semiconscious state and the urinary fistula. We feel, too, that repeated intravenous glucose and transfusions were great factors in bringing about her speedy recovery.

CLINIC OF DR. WALTER C. CHIDESTER

MILLS MEMORIAL HOSPITAL, SAN MATEO, CALIFORNIA

HIGH INTESTINAL OBSTRUCTION. A PROBLEM IN DIAGNOSIS

WE are reporting this case because it presents an interesting problem in diagnosis. Here we have a married American construction engineer, aged forty-six, referred to us without a diagnosis. The history, physical findings, and laboratory work you will see are not pathognomic of any single diagnosis.

Chief Complaint.—Severe abdominal pain of six hours' duration. The pain was steady and excruciating. It did not radiate. It was chiefly in the epigastrium, although at times he pointed to his left upper quadrant, and at times stated that it was all over the abdomen.

Present Illness.—Sunday night at 11.40 (October 7th) he was awakened from a sound sleep by a cramplike colicky pain in his abdomen. He had gone to bed early that night because he did not feel well. He ate very little supper, having no appetite. He had no pain whatever. His bowels always moved with great regularity. He was not constipated. He remarked to someone that he had a peculiar feeling in his stomach.

The pain he thought was due to "cramps" and tried to defecate. He strained at stool, but could not even pass any gas, the pain became more severe. The colic-like cramps became more numerous, and about an hour later he vomited everything he had eaten for supper. This did not relieve him. The pain began to be steady and excruciating, he called a doctor who ordered an enema. The enema returned with a good fecal result. The pain became increasingly severe. The patient became weak and broke out in a cold clammy sweat. The doctor said that his abdomen was distended and rigid. There was marked tenderness in

the epigastrium and the patient seemed to be in relative shock. He was given $\frac{1}{4}$ grain of morphia. A consultation was requested. The consultant saw the patient a few hours later. The pain had subsided somewhat, though not entirely. The abdomen was still rigid. In spite of the enema the patient felt that he was bloated and wanted to pass gas, but could not. He was sent to the hospital.

Past History.—All the childhood exanthemata, never any serious illnesses, no operations, occasional sore throat and cold in head. Denies neisserian injection and lues by name and symptom.

Family History.—Father died of "heart trouble." Mother died of questionable cancer of uterus. One brother died of "galloping consumption," and another died of drowning. One sister died of "Bright's disease." Two brothers living and well.

Marital History.—Married fifteen years, one child, eight years of age, living and well. Did not want more children. Happy home life.

History by Systems.—Head—No complaint of head, eyes, ears, nose, or throat.

Neck—No complaint.

Cardio-respiration—No complaint.

Gastro-intestinal—Appetite good. Indigestion about once in six months. Soda for these attacks relieves. Bowels very regular. Occasionally takes cascara. Never any pain or distress. Occasionally a little gas after a large meal. Heart burn seldom. Never vomits. Never has seen blood in stools. Never tarry stools.

Genito-urinary—No complaint.

Extremities—No complaint.

Physical Examination.—He was a well-developed and nourished middle-aged man lying in bed with face slightly drawn and hands pressing the abdomen as though in pain. On inspection of the abdomen for several minutes there was nothing to suggest visible peristalsis. On palpation there was generalized rigidity with the maximum tenderness in the epigastrium. There was a slight suggestion of fulness in the epigastrium, but this was

uncertain. Percussion ellicited hyperresonance. No shifting dulness was found. Auscultation revealed a few sounds, but nothing to indicate violent peristalsis or fluid. The remainder of the physical examination revealed nothing of importance. A rectal examination was negative for masses; blood or marked tenderness. An enema was repeated. It returned with only a few fecal particles. The patient vomited about 2 ounces of white frothy material. He complained of slight nausea.

Laboratory.—White blood cells 22,000. Differential white, 92 per cent polymorphonuclears.

Temperature, 99.6 F. *Pulse,* 110. *Respiration,* 20.

***x*-Ray of Chest.**—No changes of note. This was taken because deep inspiration caused so much pain that the patient would not aerate the bases of his lungs on auscultation.

Diagnosis.—(1) Ruptured gastric ulcer.
(2) Acute pancreatitis.
(3) Acute intestional obstruction.

Argument.—In favor of (1) sudden onset, relative shock, rigidity, slight history of indigestion, abdominal tenderness.

Against (1) relief from morphia. Absence of boardlike rigidity. Small evidence of gastric disturbance previously. Colicky pain.

In favor of (2) sudden onset, relative shock, fulness in epigastrium with tenderness, slight temperature, relatively high white blood cells.

Against (2) slight temperature. Moderate degree of epigastric tenderness, colicky pain at start.

In favor of (3) shifting pain, colicky pain, tenesmus, and relatively unsuccessful second enema. Relative shock coming on after a few hours of colicky pain. Slight temperature.

Against (3) white blood cells rapid onset. No history of operations. Absence of visible peristalsis. Change of pain to steady from colicky. Relatively little vomiting. Apparently empty stomach.

Note.—On the operating table a fulness was seen to shift from the left upper quadrant to the lower abdomen center. This was thought to be visible peristalsis and was the first seen.

Operation.—Left rectus incision. As the peritoneum was opened, large quantities of brownish fluid gushed out. It was thought to come from the lesser peritoneal cavity, and that the ulcer was on the posterior wall or in the duodenum. This was not verified by exploration. The pancreas felt normal. In the left upper quadrant several loops of upper ileum and jejunum were found distended and red in color. The serous surfaces were engorged with distended capillary blood vessels. The mesentery of these loops were also the same color and remarkably engorged. The line of demarkation was very distinct though not absolutely sharp. The venous stasis was so marked that mesenteric artery thrombosis was thought of, with early gangrene. A moment later, a strong band of omentum was found constricting the loops deep over the mesentery. This was doubly ligated and cut. An immediate improvement in the color of the bowel was noted. The distal attachment of the omentum was not traced. The wound was closed without drainage.

Approximately 1 gallon of peritoneal fluid was removed by suction at the time of the operation. All efforts were concentrated on repairing the fluid, and sodium loss by means of subpectorals and proctoclysis of saline and water.

Convalescence to date has been uneventful.

The patient left the hospital in two weeks and has been well since then.

Conclusion.—In the discussion of this case, several points of interest can be noted.

1. The collapse from high obstruction.
2. The misleading absence of vomiting and unsuccessful enemata.
3. The marked out pouring of peritoneal fluid, as in venous stasis.
4. The replacement of the fluid and mineral loss.
5. The relative absence of visible peristalsis due to the high obstruction.

CLINIC OF DR. FOSTER K. COLLINS

HOLLYWOOD-CLARA BARTON MEMORIAL HOSPITAL, LOS ANGELES, CALIFORNIA

AN UNUSUAL GALLBLADDER

EXCESSIVE distention of the gallbladder is usually caused by obstruction of the cystic or common ducts. If the cystic duct is obstructed retained bile and secretions from the mucous membrane of the gallbladder cause the increasing distention. According to Courvoisier's law,[1] "Where the common duct is obstructed by a stone, dilatation of the gallbladder is rare. Where the common duct is obstructed by other causes, dilatation of the gallbladder is common." He explained that tumors of the head of the pancreas almost invariably cause dilatation of the gallbladder, because the walls of the gallbladder are thin and easily distensible by the backed-up bile. On the other hand, when a stone blocks the common duct, the great majority of gallbladders are contracted or atrophied because in the majority of such cases there were first stones in the gallbladder itself causing chronic inflammation and thickening of its walls to such an extent that it is no longer distensible.

This view has been confirmed by Mayo Robson[2] who states, "Jaundice with distended gallbladder is presumptive evidence in favor of malignant disease, but jaundice without distention of the gallbladder favors the diagnosis of cholelithiasis." In his recent book on diseases of the gallbladder and biliary passages, among the cases recorded, 92 per cent confirm the truth of Courvoisier's law. Kehr,[3] whose experience includes 409 gallstone operations, states, "In obstruction of the common duct by a stone, the gallbladder is usually small and not to be felt; in obstruction by tumor (cancer) it is usually to be felt as a large elastic tumor under the right ribs." Cabot[4] found only 2 cases out of 57 in his experience that were exceptions to Courvoisier's law.

The gallbladder may be found enlarged and distended with the ducts unobstructed. In that case infection with degenerative processes in the wall structures plays an important part.

Case Report.—A male, aged forty-six, admitted to the Hollywood-Clara Barton Memorial Hospital March 6, 1928, complaining of moderate distress and a mass in his upper abdomen.

The family history was unimportant. The patient gave a history of malaria twenty years ago, a brief uncomplicated attack. Eight years ago he was moderately jaundiced for a few days, and had a brief attack of what was at that time diagnosed as gallstone colic.

He had since been entirely free from symptoms until three months ago when he began to notice a slight distress in his upper abdomen and felt for the first time a mass in that region. He thought the mass had gradually grown larger up to the time of his admission to the hospital and that he was more distressed, but never acutely. The bowels had been regular, no vomiting at any time, no jaundice, appetite fair, but there was a loss in weight of 7 pounds in the past two months, his present weight being 163 pounds. His general appearance was good.

The physical examination showed a well-nourished individual with no abnormal findings about the chest, save that the right lung capacity was somewhat diminished from the liver being situated higher than usual, and there was some evidence of myocarditis, indicated by moderate shortness of breath and rapid pulse on active exercise. The heart sounds were clear and its outline normal. The temperature was 99 F., the pulse 84, respiration 20, blood pressure, systolic 124, diastolic 78.

The abdominal wall was free from scars and the abdomen generally negative, save for a tense, smooth mass, slightly tender, extending across the abdomen in a diagonal manner from beneath the left costal border to the right lateral abdominal wall, and from beneath the right costal border to the umbilicus. The entire mass moved up and down with respiration, gave a dull note on percussion and was free from pulsation. The spleen was not palpable. There had been no edema of the extremities or other abnormality.

The laboratory work gave a negative Wassermann. Blood count, reds 5,530,000; leukocytes, 10,900; hemoglobin, 78 per cent; polymorphonuclears, 80 per cent; agglutination, four minutes. The *x*-ray examination was negative for dye tests, and a flat plate gave but a faint outline of the mass above described

Fig. 393.—Arrows indicate border of mass as shown by *x*-ray.

(Fig. 393). The final differential diagnosis included hydrops of the gallbladder, pancreatic cyst, bulging through the gastro-hepatic ligament, and subphrenic abscess, but favored the gall-bladder diagnosis because of the former history.

At operation, March 7th, under ethylene, a mid-line, Sloan, incision gave ample space for a thorough exploration of the upper

abdomen. The stomach was small, crowded well down, and to the left, but revealed no abnormality. The liver was crowded above the costal border, was thin and appeared to be free from abnormalities. The duct and head of the pancreas were inaccessible because of a tense, cystic mass, about the size and shape of a football, crowded between the liver, stomach, diaphragm, and right lateral abdominal wall (Fig. 394). The walls of this mass were free from adhesions save for a small area on its anterior surface where the transverse colon was attacked. After freeing this adhesion, the examining hand could be passed over the entire surface of this mass by crowding between it and neigh-

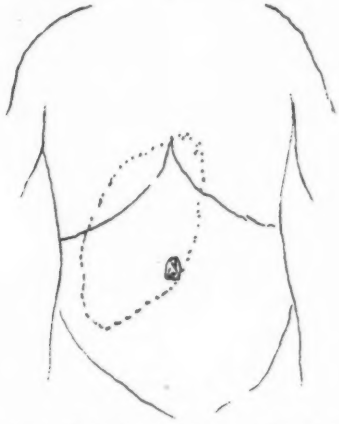

Fig. 394.—Relative position and size of mass.

boring organs, save posteriorly, where the mass appeared to be attached by a broad band. The diagnosis was still in doubt and it was thought wise to undertake the removal of the mass by a two-stage operation and its walls were sutured to the peritoneum (marsupialization) to prevent abdominal contamination. In suturing, the walls were found to be no thicker than heavy paper and there was some escape of puslike fluid with each suture puncture. On evacuation over 2000 cc. (2 quarts) of a thick white fluid was withdrawn together with numerous typical gallstones, thus establishing the diagnosis. Pathologic report:

Specimen consists of numerous small yellowish gallstones. Pus from the gallbladder: Smear, few gram-negative bacilli; culture, negative.

The recovery from the first operation was uneventful, there being profuse bile-free drainage, but good healing of the incision below the drain.

Second operation: On March 21st, the fifteenth postoperative day, the blood chemistry and other laboratory work showing a satisfactory condition, the second operation was undertaken for the removal of the gallbladder under nitrous-oxide and ether anesthesia. The original incision was reopened, the drainage

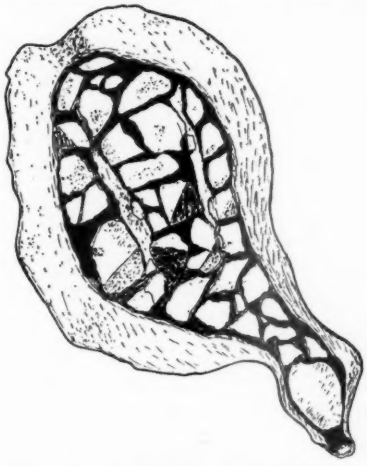

Fig. 395.—When removed at second operation gallbladder walls were very thick, non-necrotic, and contracted. Many stones were still present.

opening in the gallbladder was closed by suturing and $3\frac{1}{2}$ per cent iodine applied to the field before opening the peritoneal cavity. The gallbladder was found to have contracted down to about three times the size of normal and was free from adhesions with no evidence of necrosis of its walls. A large stone completely blocked the cystic duct near its junction with the common duct, and many stones were contained in the gallbladder. The other ducts and the head of the pancreas appeared to be

normal. The organ was removed above the stone in the cystic duct, the stone removed from the cystic duct and a tube sutured in the stump of the cystic duct for drainage. The walls of the gallbladder when opened (Fig. 395) were found to resemble, in thickness, somewhat the walls of a normal uterus and the marvel was that there could be such a degree of recovery from the former great distention.

Pathologic report: Gallbladder measures 13 cm. in length by 9 cm. in width. Wall is greatly thickened and fibrous. Serosa is hemorrhagic. Several degenerated areas are present in the walls. Large number of small grayish-black stones present. Chronic cholecystitis and cholelithiasis.

The recovery from the second operation was uneventful. Bile drainage was free for three days and had ceased entirely on the seventh day. The incision did not break down in any portion and was fully closed on the twelfth postoperative day. The patient left the hospital on the twelfth day—twenty-eight from the first operation. He was at his place of business a week later, and has steadily gained and been symptom free since.

Comment: This case seems of interest not alone because of the extreme size of the gallbladder, but also in that its walls, though distended to great thinness, were found fifteen days after drainage to have recovered to such an extent without dangerous necrosis. The progress of the case perhaps emphasizes the advisability of two-stage operations in extreme cases.

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CLINIC OF DR. L. ELOESSER

STANFORD SURGICAL SERVICE, SAN FRANCISCO, HOSPITAL

CLOSURE OF BRONCHIAL FISTULA

THE patients of this series, whatever the beginning of their ailments may have been, have offered in the course of their disease a common problem: A persistent bronchial fistula.

Case I.—Miss P. O. The first patient, a girl of twenty-three, was referred by Dr. Julius Sherman on September 22, 1926, for an abscess of the right upper pulmonary lobe. The abscess was opened and drained in December, 1926. She had a stormy course, complicated by an empyema and by repeated violent hemorrhages from the abscess cavity, which were only to be controlled by reopening the wound and compressing the lobe by gauze packing. After a year and a half recurrent suppuration and hemorrhage seemed finally to have ceased and Miss O. returned to work. A bronchial fistula in the anterior axillary line showed no signs of closing; indeed, the firm packing which was necessary in order to keep it air tight tended to enlarge the size of the opening.

On September 26, 1928 an attempt was made to close it. My notes read: The fistula is circumscribed and the scar opened. The mamma is reflected inward. The pleura is exposed at the lower edge of the wound and with little difficulty the underlying lung is separated. As one follows the lung around the edge of the opening, which measures about $2\frac{1}{2}$ by $3\frac{1}{2}$ inches in diameter, it becomes more and more difficult to recognize the lung. Finally, after some trouble, one sees that the lung exposed at first was the middle lobe and that the upper lobe containing the fistula is airless, gray, shriveled, and very tightly adherent to the pleural wall, it being separated with the utmost difficulty. Finally the

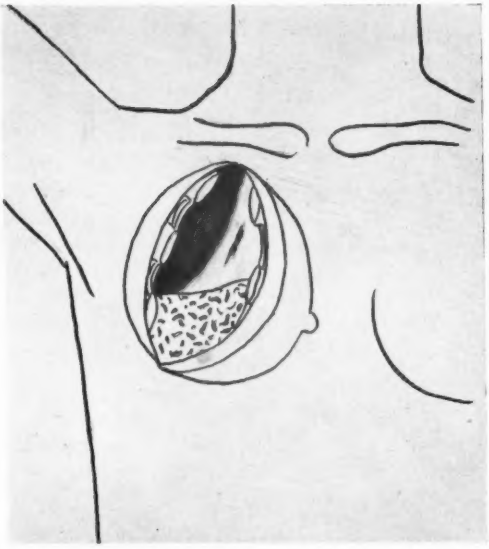

Fig. 396.—Case I. Fistula of right upper lobe.

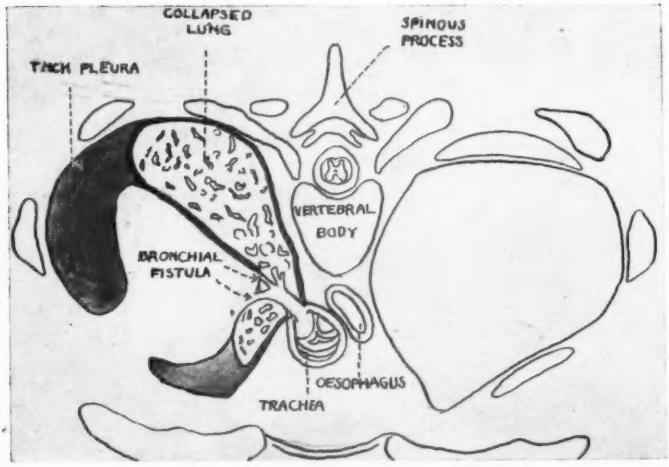

Fig. 397.—Case I. Diagrammatic cross-section.

neck of the fistula which leads into a bronchus about the size of a slate pencil is isolated. Upon pinching it with the finger the leak of air from the fistula stops. A mattress stitch of chromic gut inserted at this place entirely controls the leak. The bottom of the trough, which was formed after splitting the fistula, is further obliterated by means of two or three chromic stitches. The very thick interlobar septum, which is firmly attached to the chest wall, is severed with a scissors. A small iodoform pack is placed on the apex of the lung. The wound edges are approximated with a few silkworm gut stitches. The induration of the upper lobe was such that the fistula retracted toward the hilus in an unsatisfactory manner and the ultimate outcome is uncertain.

Following operation, the patient contracted an upper respiratory infection, the fistula broke open and in December of 1928 she was in *statu quo ante.*

A renewed attempt was made in November, 1929. My notes read:

Procedure.—On account of a persistent bronchial fistula of the right upper lobe, following abscess, operation is decided upon. The abscess itself had, after various operations at this hospital, healed. The patient had been free of sputum, fever, and cough for months. A previous attempt at closure of the fistula had proved unsuccessful, on account of the many dense adhesions which did not allow of proper mobilization. Therefore, a U-shaped incision is made around the right breast, following the old scar, but curving downward in the midline, so as to expose the front end of the first, second, and third ribs. By pushing the breast downward, one brings the pleura covering the defect in the chest into view. Separation of this from the anterior part of the middle lobe is easy, for the adhesions are here thin and easily separated. The front part of the upper lobe is also exposed without much difficulty. After the fistula is circumscribed an attempt is made to free the back of the upper lobe to the rear of the fistula. This proves a matter of the greatest difficulty, the adhesions being so dense that they make separation by the finger impossible, and offer much resistance to the

scissors. The lobe is finally freed with the loss of perhaps a pint of blood from pleural adhesions. The fistula is then dissected out from inside the lobe. The fistula leads first backward and then downward toward the hilum. It is dissected out gradually, the vessels being caught, and the base of the bronchus closed with interrupted stitches of fine black silk. The stump is covered by folding the remains of the lobe over it, and covering this again with the thickened pleura of the upper edge of the middle lobe. The mamma is laid over the defect and held in place by a few silkworm gut stitches.

After the operation, which was conducted under satisfactory anesthesia (as far as the depth of the anesthetic went) with sodium amytal, aided by novocaine, and at one time (to prevent cough) by touching the bronchial lumen with a pledget of cocaine, the patient was deeply shocked. The pulse was barely perceptible, the blood pressure was so low that it could not be read, and the skin was of a waxy yellow hue. She was returned to bed where, at about 11.00 P. M., the shock and fluttering pulse of about 160 continuing, 500 cc. of the mother's blood were transfused into the patient according to the method of Kimpton-Brown.

The patient's convalescence was delayed by an infected hematoma over the sutured upper right lobe. The hematoma was drained. The sinus closed and there has been no recurrence of this fistula.

In this patient are illustrated some of the difficulties that may arise at operation. Closure of upper lobe fistulas is difficult; fistulas of the lower lobes ordinarily offer no trouble. The upper lobe is difficult to mobilize, apical adhesions may be very dense, and the atelectatic lobe itself exceedingly hard and friable. The keynote of successful closure of bronchial fistulas, as of fistulas in general whether bronchial, intestinal, ureteral, or what not, is perfectly free mobilization, and this in a densely adherent, shrunken, friable, airless upper lobe may be very hard to attain.

Case II.—Mrs. H. K. The second patient is a Swiss woman who had a right lower lobe abscess treated elsewhere by multiple

small rib resections. She was admitted to St. Luke's Hospital, where, on August 1, 1927, three ribs were resected and an abscess the size of a hen's egg was drained. She made a prompt recovery and gained some 40 pounds. Cough and expectoration entirely ceased; she did her housework and considerable work on a ranch. The bronchial fistula, shown in the figure, was dressed by a relative. Her dressings being irksome, she re-entered hospital for closure of the fistula.

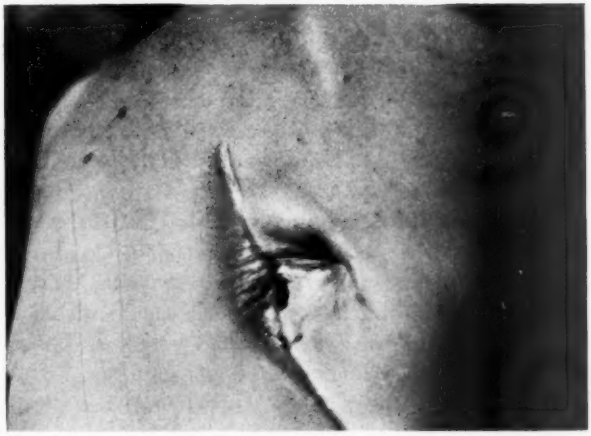

Fig. 398.—Case II. Bronchial fistula after abscess of right lower lobe.

My notes read (December 16, 1929): *Procedure:* On account of an open bronchial fistula of the right lower lobe, following drainage of a lung abscess in a patient who had perfectly regained her previous health, operation has been decided upon.

The fistula is circumscribed, the complicated star-shaped scar being excised with the fistula at its center. Everywhere about it is an adhesive pleurisy, but the meshes of the pleura are easily separated, and the fistula followed to a point where it leads into two small bronchial openings. The wound bed remaining after its excision from the lung, and ligature of the two

above-named bronchial openings is closed with interrupted catgut stitches. A layer of pleuritic adhesions is sewn over the first suture line, and the wound is closed with silkworm gut.

There is some air issuing from the wound, so the sutures are removed in order to investigate. It is then found that the air comes not from the lung, but from a localized pneumothorax between the middle and lower lobes. The wound is again closed.

The wound healed kindly. The patient made an uninterrupted recovery, and has remained well since.

Case III.—Miss L. H. The third patient is a woman of fifty-three, referred by Dr. Philip King Brown on September 24, 1928. Her horribly foul sputum, of which she coughed up a pint or more daily, had banished her for years to the life of a recluse on a small chicken ranch. She had a bronchiectasis of the left lower lobe and also of a part at least of the left upper, with a stenosis of the left major bronchus. In October, 1928, the left lower lobe was opened in several sessions with the cautery. It contained enormous bronchiectatic cysts with scarcely any alveolar tissue. The patient gained weight and strength; the sputum decreased to about 100 cc. per day, but did not entirely disappear. On July 5, 1929, therefore, the polycystic upper lobe was collapsed by resection of the remaining seven upper ribs. Hereupon, expectoration ceased, the sputum amounting to about 15 cc. per day. The patient returned to the country, where the large trabeculated cavity which represented the open cysts of the lower lobe was dressed by her doctor several times a week.

She re-entered hospital for closure of the fistula in September, 1929. My notes read (September 30, 1929): *Procedure:* On account of a bronchial fistula remaining in the left lower lobe after treatment by cauterization of a bronchiectasis, operation is decided upon.

The patient is prepared with 2 grains of luminal, $\frac{1}{4}$ grain morphine, and 1/150 grain of atropine; another 1/6 grain of morphine is added later. The ribs are anesthetized with novo-

caine. During the anesthetic, after the lobe is freed, the patient is harassed by a constant cough. This ceases after the open bronchial mouths are touched with cocaine, and from now on the operation may be conducted almost without general anesthesia.

The lobe is freed with the greatest difficulty, dissection being fairly easy posteriorly and between the lobe and diaphragm, but impossible medially between the pericardium and lower border of the upper lobe, which makes operation difficult and separation of the pedicle unsatisfactory. After isolation of the pedicle as far as possible, the open bronchial lumen is closed with mattress sutures of chromic gut. Several large vessels are tied, and the remaining space is loosely packed with iodoform gauze.

The lobe cut open shows a surprisingly large bronchiectatic pocket which, although its entrance scarcely admits a straw, has a dependent portion about the size of a pullet's egg.

She made an uncomplicated recovery. The wound healed rapidly and the fistula remained closed. She was seen in March, 1930. The wound was healed except for a small sinus in the upper part of the scar. The temperature did not exceed 99 F. The sputum amounted to about 15 cc. per day and came probably from the left upper lobe. She has gained weight and strength and leads a normal existence.

Case IV.—Miss K. N. The fourth patient is a girl of twenty, who was sent by Dr. Doxey Wilson of San Jose. In March, 1928 the left lower lobe, which was the seat of a suppurative bronchiectasis, was removed in two stages. In August, 1928 the lower portion of the left upper lobe, which also contained suppurating bronchiectatic cavities, was removed. Following this second operation, cough, expectoration, fever, and sepsis disappeared and the patient gained weight and strength. She was incommoded considerably by the dressings and packing that the large resulting cavity required and asked that the fistula be closed. On July 26, 1929, therefore, the left diaphragm was raised by resecting the phrenic nerve. Final closure was delayed until December of the same year. On December 5, 1929,

a small section of the seventh to the second ribs, but not of the first, was removed in order to facilitate closure of the very large bronchus.

On December 17, 1929, the preparatory operation was followed by closure of the fistula. My notes read: *Procedure:* On account of persistent bronchial fistula after left lower lobectomy, in a patient who is now free of cough, sputum, and fever, and after preparatory thoracoplasty, operation is decided upon.

With not as much difficulty as was expected, the lung is separated from the pericardium, the diaphragm, and the ribs. Its separation from the upper wound margin, *i. e.*, the lower surface of the left upper lobe, offers more difficulty.

The bronchial fistula, which consists of three larger bronchi with some intervening epithelium, is extirpated from inside the remains of the lobe which contain it. With considerable difficulty the air leak is stopped, and the remains of the hilus covered. The scar is united by a few deep mattress stitches sealing off the pleura, and two rubber drains are placed into the pleural cavity.

Kimpton-Brown transfusion, 300 cc.

The patient made an uncomplicated recovery: The drain was removed in three or four days. The wound healed kindly and has remained closed.

Case V.—Mr. H. L. This patient, a young student, suffering from a polycystic disease of the left lung, was sent me by Dr. James Ward. The cystic left lower lobe was opened and drained in several sessions with a Percy cautery. Sputum and cough having ceased, an attempt was made to close the left lower bronchus which communicated with an enormous collection of trabeculated cavities.

My notes read (January 24, 1928): *Procedure:* The sacculated and open lower lobe was dissected off from the pericardium and diaphragm to which it was attached, partly with a knife, partly with a galvanocautery. A thin layer of alveolar parenchyma surrounded the large pouches. At the end of dissection two large bronchial branches led into the left lower main

bronchus. These were cut across, the vessels of the hilum were tied, and the bronchial mouths closed with fine black silk sutures. The soft parts, the skin and the subcutis were loosened, dropped in over the bronchial stump, and loosely united with silkworm gut sutures. A transfusion was done on February 7th.

The boy made a good recovery and on March 12th was sent home with a small sinus leading to the stump of the left lower main bronchus which still secreted a few cubic centimeters of

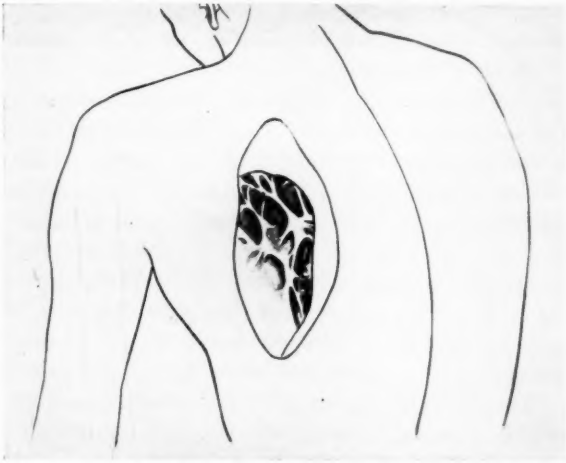

Fig. 399.—Case V. Large bronchial fistula remaining from opening of polycystic lower lobe. (Drawn after photograph.)

mucopus a day. Since he has been at home a few black silk sutures have been discharged from the sinus. A lipiodol injection shows it to lead into the left main bronchus. No connection between the large cyst of the upper left lobe and the sinus is demonstrable.

Case VI.—Mr. H. G. The sixth patient, an Italian of thirty-five referred by Dr. John Graves, had a bronchiectasis of the right lower lobe resulting from aspiration of a large mutton bone which had remained for years in his right lower bronchus. The bron-

chiectatic pouches were opened with a galvanocautery in several stages, beginning October 6, 1925. Cough and expectoration ceased and the patient gained much weight.

On August 20, 1927, my notes read: The patient has a huge bronchial fistula. The right main bronchus is open and debouches into the wound at about 1 centimeter from the bifurcation, so that one can look directly into the trachea. In the distal part of the cavity which connects this bronchus with the skin are a few bronchiectatic pouches containing pus. He has some purulent sputum.

Procedure.—Right-sided phrenectomy under local anesthesia; about 3 inches of the nerve are resected.

Then, turning the man on the left side, the junction of the skin and the mucous lining of the bronchial fistula is circumscribed and the fistula dissected after the manner of Lebsche. There is one larger vessel, probably the main artery from the lower right lobe, which bleeds and is troublesome to ligate. The mucosa at the mouth of the bronchus is excised and the bronchus closed with submucous stitches of fine black silk. Lying over the lung is a loose pleura, so that a good portion of soft lung may be sutured over the bronchus. This is accomplished with another row of fine silk sutures, taking in the thickened pleura. The skin of the opening in the thorax is then freed from the underlying wound edges and inverted into the defect.

Operation was performed under satisfactory gas and local anesthesia, aided at times by small amounts of ether.

This patient made an uncomplicated recovery and has remained well since.

Case VII.—Mrs. H. T. Dr. James Herring kindly asked me to see the seventh patient, an old lady of seventy with a gangrene of the lung and a localized pyopneumothorax surrounding it. The empyema was drained by a rib resection. Large pieces of the right lower lobe sufficient to fill a teacup sloughed and were extracted from the wound with a sponge stick. A bronchial fistula resulted. I feared to let her go home with a drainage tube in her chest and a bronchial fistula, as she lived at a dis-

tance and as Dr. Herring had found it increasingly difficult to insert the tube. Operation was therefore undertaken with the object of removing enough of the chest wall to bring the fistula to the surface and make superficial dressings possible.

Procedure (May 7, 1930): In a patient in whom previous operation had been done for empyema following gangrene of the lung, and in whom the right lower lobe of the lung had sloughed and had been removed at various dressings through the drainage opening, operation is decided upon on account of persistence of a bronchial fistula, and of the wish of the patient to be free of the tube.

An additional 2 inches of the previously resected rib and about 2½ inches of the next higher rib are removed posteriorly with the cautery, exposing a pleura about ¾ inch thick. An area of this pleura, about 2½ inches long and 2 inches wide, is excised with a galvanocautery. This exposes a fistula which leads directly through a little tunnel in the lung into a small area previously visualized in the thoracoscope. It contains perhaps a half dozen small bronchial mouths, the whole area being about the size of a dime.

The adjacent lobe is freed from the pleura and from the diaphragm where its attachments are very dense, and the scar surrounding the fistulous tract is united with a few catgut stitches, thus closing the fistula. The resulting space is packed with iodoform gauze, and the skin edges approximated.

There is one small lymph gland the size of a lentil in the intercostal space which is removed for culture.

The patient made a smooth convalescence, but gradually, some two weeks after operation, it was apparent that the fistula had recurred; the patient expelled a little air from the wound when she coughed or strained. The fistula, however, was small. The wound was clean and she was discharged to her home with superficial dressings in the hope that the small opening might still close.

Case VIII.—Miss R. This patient, a girl of thirty-one, had a cough and much foul sputum following an attack of influenza

ten years before. She had a bronchiectasis for which lobectomy was done in 1928. Expectoration and cough ceased.

On September 26, 1929, the fistula was circumscribed, the lung freed from its pleural attachments, and the left lower bronchus closed by fine silk stitches. The upper part of the incision was closed, the lower left open with a small gauze pack. The patient made an uncomplicated recovery and was discharged on November 13, 1929, with a closed fistula.

Case IX.—Mrs. A. The ninth patient is a housewife of thirty-two, who four years ago attempted suicide by shooting herself in the left chest. She shot her left thumb off and perforated the chest. Fluid collected in it; a tube was inserted through which the fluid drained. She was in hospital about a year, during which plastics were done on the thumb. After her return home in October, 1928, she miscarried twins in the sixth month of pregnancy.

Dr. Emma Willets and her staff of the Children's Hospital were kind enough to invite me to see her in December, 1929. At that time she had a large left-sided pneumothorax with very little effusion. She had a temperature of 99 to 100 F., but no cough and no sputum.

I thought that either a tuberculosis or a high bronchial fistula underlay the pneumothorax, at the bottom of which the left lung lay totally collapsed. A needle inserted into the pleural cavity demonstrated the presence of a bronchial fistula.

The chest was drained by a lower rib resection. The bronchial fistula remained. On May 24, 1930, it was decided to attempt to close it. *Procedure:* An incision was made in the old scar. After opening the chest by an anterior flap with a medial base, a number of small fistulous openings in the left upper lobe, probably bronchi of the second order, came into view. The lobe was tightly adherent to the visceral pleura, and to the great veins; it was impossible to free it, so that a pedicle could not be reached. The trough containing the bronchial fistulas was therefore slit, its walls united with catgut and this suture line reinforced with bits of pleura. An iodoform gauze pack was in-

serted between this pleural flap and the lateral thoracic wall. Two weeks later a little air began to leak on coughing, but the underlying lung has expanded and the fistula gives promise of healing spontaneously.

To drain the air passages of these patients, most of whom suffered from a longstanding cough, profuse expectoration, and the constitutional signs of chronic suppuration, seemed imperative; to close their drainage openings once suppuration had ceased

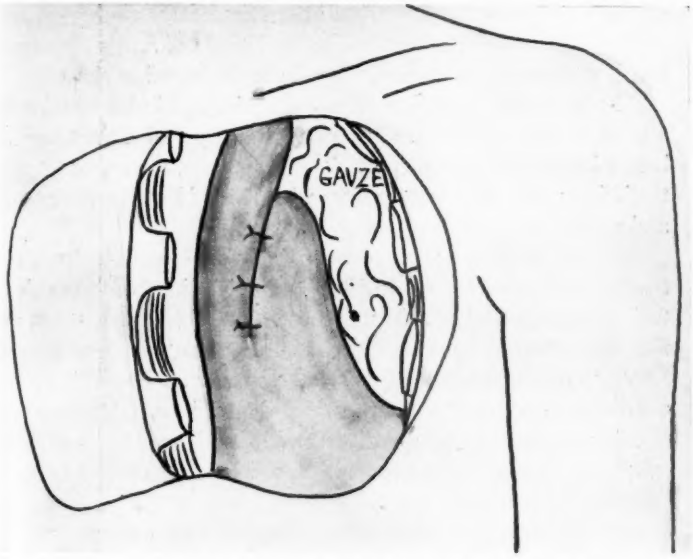

Fig. 400.—Case IX. Upper lobe fistula covered with flap of pleura.

was rather a matter of convenience than necessity. They had all been discharged from hospital and allowed to recuperate from the drainage operation; cough and expectoration had ceased and the wounds secreted no more than the mucus which bronchial epithelium always secretes when exposed to the open air. Most of them had large fistulas, communicating directly with bronchi of the second order at least; some, in whom lobectomy had been done, had fistulas of the main lobar bronchi. These

patients were voiceless when the fistulas were not closed with gauze packing. When the fistula was open most of the respiratory air came through the wound and not enough passed through the glottis to intonate speech. Such patients were able to keep the glottis closed and breathe freely through their wounds.

Many of them found the daily dressings irksome. The dressings were constantly subject to the pressure of the respiratory air stream and were difficult to hold in place. The whistling noise of air escaping under the dressings was embarrassing. Most of the carriers of these fistulas, although greatly preferring the fistula to the cough, expectoration, and bouts of sepsis that they had been through, were anxious to have the opening closed.

Small fistulas, resulting from the drainage of abscesses, usually close spontaneously. The cavity of larger abscesses, which it has been necessary to pack for a long time, retracts and epithelializes; the epithelium unites with the skin of the chest wall and spontaneous closure is no longer possible.

Fistulas resulting from lobectomy rarely close; the lung retracts; the bronchial epithelium, the epithelium of bronchiectatic pouches and the skin unite. The retracted lung takes on the appearance designated by Lebsche as "gridiron lung." Large, tough septa, carrying blood vessels and bronchi, stand out between numerous pouches and depressions. At the apex of this multilocular sac are discoverable, with more or less difficulty, one or more open bronchi. A method of closure has been described by Lebsche.

The patients are admitted to hospital and observed for a few days to make sure that expectoration has entirely disappeared and that the wounds are clean. Two hours before operation they receive 2 to 3 grains of luminal and one half hour before operation $\frac{1}{6}$ to $\frac{1}{4}$ grain morphine sulphate.

For lower lobe fistulas the patient is laid on his good side, for upper lobe fistulas on his back. The opening in the chest, which in the course of healing has contracted considerably, is circumscribed with a knife at the junction of the bronchial mucosa and skin; this enlarges it to its original size. Bleeding is inconsiderable. Once the resected rib ends are reached the pleural

adhesions fastening the lung to the chest wall may be separated by blunt dissection. The edges of the bronchial fistula are caught by Allis clamps as they are freed.

Fistulas resulting from lobectomy, or those resulting from extensive cautery operation in which merely the shell of a lobe

Fig. 401.—"Gridiron lung" circumscribed at junction of skin and mucosa.

remains, are usually dissected out without great difficulty. Adhesions to the chest wall are thin, separable by blunt dissection, and comparatively bloodless. Those to the diaphragm are tougher and contain large vessels. They bleed less if separated

with the galvanocautery instead of the knife. Hemostasis should be accurate, and all vessels should be severed between two ligatures. Pericardial adhesions and those between two lobes are also likely to be dense. Dissection proceeds until the pedicle is reached. The large pulmonary vessels supplying the opened lobe are caught, tied, and severed; a little lung tissue is left

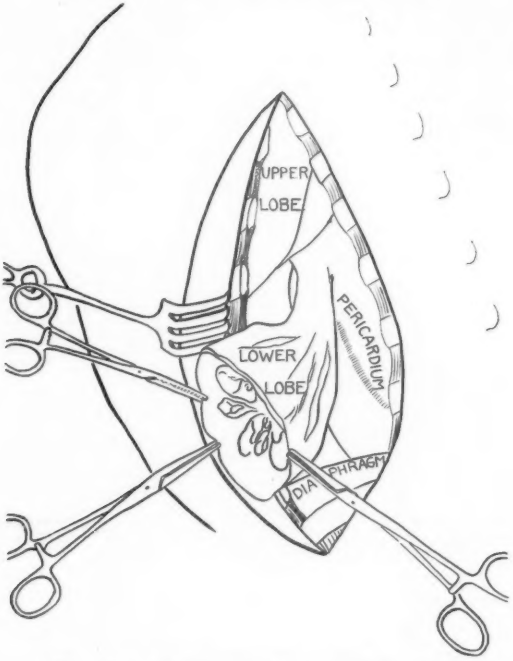

Fig. 402.—Lobe dissected free down to pedicle.

at the hilum to be used as a covering for the bronchial stump. Small incisions into the pedicle alternate with suture and ligation until the opening of the bronchus itself is reached. This is closed with interrupted stitches of fine black silk, the knots tied toward the inside. The lobe is not entirely severed until the bronchus is closed and all the vessels tied. The stump is then covered with whatever remains of surrounding lung tissue or bits

of pleura. The cavity left in the chest after removal of the lobe looks surprisingly large, but it is rapidly obliterated by a dilatation of the neighboring lobe, and rise of the diaphragm. Preliminary phrenectomy will help greatly to obliterate the cavity left after removal of a lower lobe; upper lobe cavities may be closed by paravertebral resection of a few of the uppermost ribs. The wound in the chest is closed except for a small rubber

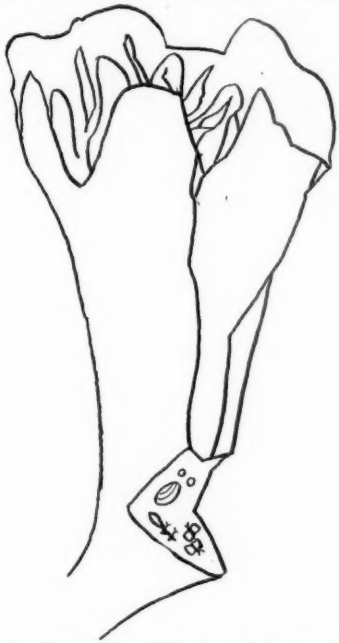

Fig. 403.—Pedicle partially severed; main bronchus and large vessels exposed.

drain. The skin and soft parts are pressed into the chest by means of a large, soft rubber bath sponge, held in place by adhesive plaster strapping.

In smaller bronchial fistulas, resulting from the drainage of large abscesses, the lobe containing the fistula is thoroughly mobilized by severing all its pleural adhesions; the edges of the tough membrane lining the fistula are caught and the membrane

is dissected out from the lobe in which it lies. Dissection is bloodier and hemostasis more difficult than in dissection of an entire lobe, for one is working here not in a comparatively bloodless pleura, but in the parenchyma of the lobe itself. Numerous pulmonary vessels leading to the fistulous tract require ligation. Dissection and ligation proceed until the sac depends from one or two larger bronchial branches. These are crushed and ligated,

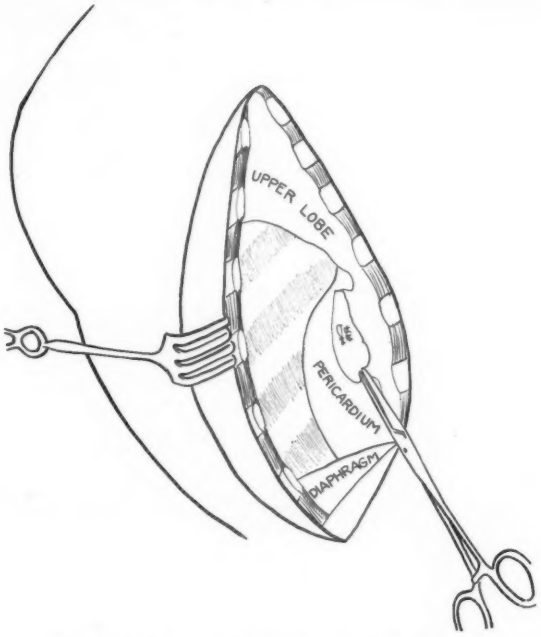

Fig. 404.—Vessels tied; bronchus partially sutured.

or sutured with black silk, and the remains of the lobe sutured over them with several layers of fine catgut. The lobe should be handled gently. The chest is closed except for a small rubber drain. Gauze packing should not be used. Fistulas in this series failed to remain closed only in those patients in whom the intrapleural cavity was so large and so stiff walled that it seemed safer to pack it rather than close the chest over it.

Technically, the operation is not easy; neither is it dangerous. Mortality was nil. The drainage tubes were removed in three

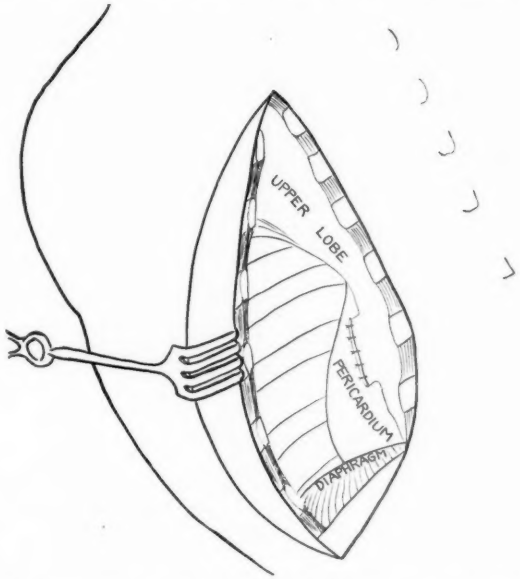

Fig. 405.—Stump covered over by hilar remnants of lung tissue.

or four days; the wounds healed kindly and the patients were dismissed from hospital in about two weeks.

CLINIC OF DR. J. EARL ELSE

UNIVERSITY OF OREGON MEDICAL SCHOOL

ACUTE NONHEMORRHAGIC PANCREATITIS

THE patient that we have in the clinic this morning is a female, forty years of age, a secretary by occupation. Her father is living, but has organic heart disease. The mother died recently of cerebral hemorrhage. One sister died of ovarian cancer.

The patient's history is negative except that for several years she has had distress in the upper right quadrant of the abdomen. Attacks came on at a frequency varying from a few days to a few months, but they have been gradually getting closer together. Sometimes these attacks would be manifest by a dull aching pain. At other times they were cramplike in character. During the past year and a half these attacks have sometimes been accompanied by nausea and vomiting. At times she would have distress that was relieved by food, soda, or magnesia. When she would vomit, the vomitus was sour, contained mucus but no bile. These attacks were sometimes accompanied by dizzy spells. During the past three years the patient has lost 30 pounds in weight. About ten days ago the patient had an attack of severe cramplike pain in the epigastrium, followed by profuse perspiration. This lasted but a few moments and was not accompanied by nausea or vomiting. A week later the present attack began with intense pain in the epigastrium. I saw her shortly after midnight at which time she was in bed and appeared to be in great pain. She described the pain as being different from any pain that she had previously had. She had tried taking food, but instead of relief it caused her to vomit. She was well nourished. Had a temperature of 100.5 F. Her teeth showed evidence of infection. The heart and lungs were normal. Upon examination of the abdomen it was found to be

moderately distended, but without much rigidity. A mass was palpated above the navel extending across the midline farther to the left than to the right. Tenderness was found along the entire length of the mass. There was also definite tenderness over the gallbladder. The patient was not vomiting at the time she was seen. There was no visible peristalsis. She was sent to the hospital where no further information was obtained except that the Graham-Cole test was positive. Here we have a patient giving a definite history of gallbladder disease, a definitely tender gallbladder, a positive Graham-Cole, but in addition to this there is a mass extending transversely across the abdomen above the navel with a line of tenderness over the mass. Since coming to the hospital her temperature has varied between 99.4 and 101 F.

The anesthetic being used is ethylene and oxygen. For the past four and a half years we have been using this almost exclusively. In abdominal work it is frequently reinforced with a very small amount of ether. In my judgment ethylene is as nearly a perfect anesthetic as we have at the present time, for the patient is more nearly under the immediate control of the anesthetist. With ethylene the anesthetist can hold the patient just where she wants her to be. In the case of an emergency the patient can be brought out in a very brief time or brought to the point where she is just asleep, or if the anesthetist is holding the patient where she is just asleep she can in an equally short time place her sufficiently under for major work. Ethylene is particularly of value in goiter surgery. Since we have been using ethylene I have discontinued local anesthesia almost entirely. Many goiter patients are nervous and unless one gives them so much preoperative sedative that they are dopy, they are apt to be very apprehensive during the operation, and hence more subject to shock. We give the patients 5 or 10 grains of veronal the night before the operation, $\frac{1}{6}$ grain of morphine, 1/150 grain of scopolamine an hour before, and $\frac{1}{6}$ grain morphine and 1/150 grain atrophine a half hour before operation. With proper preparation of the patient before the operation and with these preoperative sedatives, the patient comes to the operating room

in a quiet manner and is put to sleep with ethylene without any trouble. As we finish the operation, before closing the wound, the anesthetist awakens the patient sufficiently to permit her to gag two or three times in order to open up any vessels that are apt to bleed later. Then without the patient's realizing that she has been awake she is again put back to sleep and the wound is closed. She is then again awakened so that we talk to her before she leaves the room after the operation. For an abdominal operation such as this today it is frequently necessary to give just a very small amount of ether. The amount, however, is so little that the patient does not ordinarily have much nausea.

We will now make a right rectus incision extending from about 1 inch below the ensiform cartilage to a point a little below the navel. The incision is made about the middle of the rectus muscle so that we may displace the muscle either way in exposing the upper abdominal viscera. I am displacing the muscle inward as in this location I may explore both the pancreas and the gallbladder. Although I see no evidence of apparent necrosis, the pancreas appears to be about three times normal size. The enlargement involves the entire pancreas and it seems to be enlarged in about the same proportion throughout its entire length. The gallbladder is thickened and contains stones. The problem now arises as to what should be done. We have here a patient who has had a gallbladder lesion for a long time, as is shown by the history and the fact that there are stones in the gallbladder. The pancreatic involvement is of recent origin. It is possible that the patient did have a mild attack ten days ago, but she has clearly stated that the attack three days ago was different from anything that she formerly had, so I believe that that was the time of the beginning of the pancreatitis. As there is no apparent necrosis, this probably means that there has been no necrosis of the pancreas. Fat necrosis is due to the escape of the fat enzyme produced in the pancreas. The proper treatment for pancreatitis is adequate drainage. There are two chief methods of draining the pancreas. The first is through the biliary apparatus, and the second, the draining of the pancreas itself by placing cigaret drains or Penrose drains containing

gauze about the pancreas. I think in this case we had better do both, because there is gallbladder involvement antedating the pancreatitis. This is the sixth patient with acute nonhemorrhagic pancreatitis upon which I have operated. In five of the six there was gallbladder disease antedating the pancreatitis. In one there was not. In the one in which the gallbladder disease did not antedate the pancreatitis, I placed drains about the pancreas and the patient made a satisfactory recovery. In cases where there is a gallbladder disease, I prefer to drain the gallbladder as well as to place drains about the pancreas. We formerly thought that in draining the gallbladder we would drain the pancreas, but Mann and Giordano have shown us that in only 45 per cent does the common bile duct and the duct of Wirsung open in common through the papilla of Vater and that in these in only 3.5 per cent is it possible for a stone to produce an obstruction that will permit the regurgitation of the bile into the pancreas. This probably means that we cannot drain a pancreas through the gallbladder in over 45 per cent, but as there are 45 per cent in which the two ducts open in common the draining of the bile would have a tendency to relieve any congestion that may occur in the papilla of Vater so that the pancreas could discharge more frequently through the duct of Wirsung. Moreover, it is quite possible that an acute pancreatitis secondary to gallbladder disease occurs only in this 45 per cent. For that reason I believe it best to always drain the gallbladder if there is gallbladder disease. I prefer draining the gallbladder rather than removing it although that may necessitate a subsequent operation. Perhaps it would be better to remove the gallbladder and drain through the common duct; however, I think that we get better drainage through the gallbladder than through the common duct, and further, should there be an obstruction at the ampulla that would need continuous drainage, the gallbladder is available for anastomosis to the alimentary tract.

As we open the gallbladder we find that there are many small stones. We will carefully remove them and then insert a tube which has been fenestrated. This we hold in place by two purse string sutures, placing the first one around the opening

we have made in the gallbladder, tying it about the tube and then taking a stitch through the tube and tying it for the purpose of retaining the tube for several days. We now pass this portion where we have taken the purse string suture down into the gallbladder with the tube and take another purse string suture in order to prevent a leak. The reason for using the first stitch to anchor the tube in place of the second is that there might be a leak about the stitch going into the tube, and if we use the first stitch the leak will take place between the purse string sutures. I usually bring the drain in gallbladder surgery out through a stab wound. I do this because if we bring a drain from an infected area through the line of incision we invite infection along the line of incision. In the process of healing there is always some serous exudate. If we bring bacteria to this exudate they immediately begin to grow and are apt to extend along the whole line of the incision. By carrying these drains out through a stab wound the number of infected wounds has been greatly reduced.

In draining the pancreas we expose it and place the drain in direct contact. In the involvement of the entire pancreas such as we have here, drains should be placed about the head and body of the pancreas. When only the head is involved, we place them about the head only. It is well with such an extensive amount of swelling of the pancreas as there is here, to make some superficial incisions through the capsule in order to promote free drainage. These should not be deep, however, because first, they will incur bleeding, and second, if we cut the smaller pancreatic ducts it will mean drainage of the pancreas secretion which may result in a variable amount of fat necrosis. This is not a serious factor so long as the main ducts remain open. In one patient with a partially ruptured pancreas and quite marked fat necrosis, rapid recovery took place following the placing of drains about the ruptured area.

In closing abdominal wounds I use double catgut, for in times past when I was using single gut I recall I had one patient in which the wound broke open, and upon reoperation I found that the gut in the peritoneum had broken in the middle. I

have taken the drains of the gallbladder out through a stab wound at the outer side of the incision. I am going to bring the pancreatic drains out, however, through the lower end of the incision. I do not bring all the drains out through the same place because, in the first place, it is too far away to carry the pancreatic drains to the stab wound, and, in the second place, I do not want them to come out the same wound, as I remove the pancreatic drains in forty-eight hours while the tube in the gallbladder I want to remain for a considerable time.

The wound is covered by a dressing which I want you to see. On each side of the abdomen we place these short strips of ad-

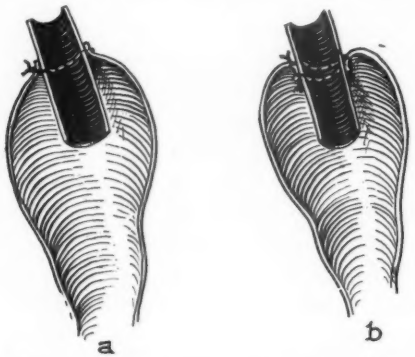

Fig. 406.—Note that the first purse string suture shown in (*a*) goes through the tube on the left for the purpose of anchoring it. The tube is then pressed down into the gallbladder and the second purse string suture placed. If there is a leak from the opening in the tube, the second purse string prevents escape of material into the abdomen.

hesive plaster that have hooks such as are used on men's shoes for laces. We place heavy rubber bands across the abdomen, hooked at either end on these hooks. The advantage of this dressing is that there is always the same even support to the abdomen and we can easily unhook the bands for dressing or inspection of the wound. Where adhesive plaster is used it has to be removed at each dressing. In many patients with tender skin this results in the production of superficial ulcers. Further, adhesive plaster gives the proper support to the abdomen only

when the abdomen is in the same position as when it is applied. If the abdomen becomes more distended the adhesive becomes too tight and may cause considerable distress. If the abdomen becomes less distended the adhesive is loose and gives no support, whereas the rubber bands always give the same even support to the abdomen.

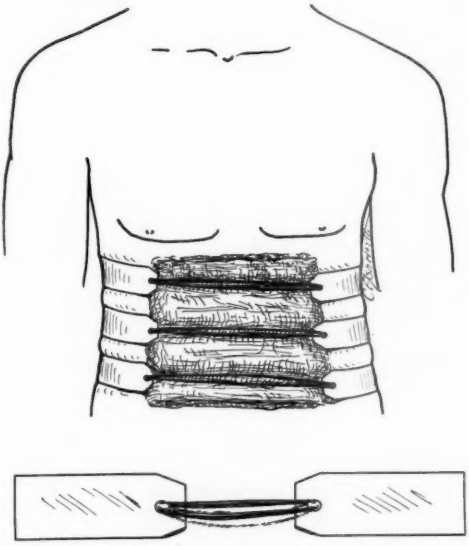

Fig. 407.—A strip of adhesive with hooks such as those used on shoes are placed on each side of the abdomen. Fairly heavy rubber bands are placed between the hooks. This gives steady even pressure regardless of the degree of distention of the abdomen.

I should like to review briefly the subject of acute pancreatitis. As we read the literature we find that it is customary to classify pancreatitis as acute hemorrhagic, subacute, and chronic. This patient upon whom I have just operated, according to that classification, would have to be classified as subacute pancreatitis. But she had very severe pain; she was acutely ill, and had a temperature of 101 F. at times. By no stretch of the imagination could her condition from the clinical standpoint be regarded as

anything but an acute illness. It is going to be necessary for us to revise the pathologic classification of pancreatitis and also some other diseases to conform to the clinical findings. A patient to be acutely ill has an acute disease. The fact that acute hemorrhagic pancreatitis is a more serious disease does not mean that nonhemorrhagic pancreatitis is not also an acute disease. If we do not wish to speak of both as acute hemorrhagic pancreatitis we might use Boyd's suggestion of pancreatic necrosis for acute pancreatitis with hemorrhage. Personally I prefer the classification of acute hemorrhagic pancreatitis, acute nonhemorrhagic pancreatitis, subacute pancreatitis, and chronic pancreatitis.

Cholecystitis is an important factor in the production of acute pancreatitis. As I said a few moments ago, this is the sixth patient that I have seen. In addition to this I have studied one other patient who was operated upon by Dr. W. K. Livingston at the County Hospital about a year ago. Of these seven patients five had a chronic cholecystitis antedating the pancreatitis. In two the gallbladder appeared to be normal. In reviewing the literature this seems to be about the usual proportion. Schmeiden in his study of 1258 collected cases of pancreatitis found a history of gallbladder disease in 69.8 per cent. Infection may reach the pancreas from the gallbladder through the pancreatic duct from the common duct, the lymphatics, or the blood stream. Opie in 1901 reported the finding of a stone producing an obstruction of the ampulla of Vater so that bile regurgitated into the pancreas. Mann and Giordano in a recent study found, however, that in only 3.5 per cent of all individuals was this possible. Archibald observed a spasm of the sphincter of Oddi in a cat which would permit regurgitation of bile and in a postmortem examination a number of years ago, I found a stenosis of the ampulla of Vater so that the bile had to ascend the duct of Wirsung in the pancreas, then cross through a large anastomosis to the duct of Santorini and be discharged into the duodenum through this duct (Fig. 408). As a result of spasm or stenosis regurgitation of bile in the pancreas could take place in the 45 per cent where the two ducts open in common. As acute pan-

creatitis is not a common disease, it is quite probable that it is only found in those in which pancreatitis develops. This observation is supported by a report of a case in which at laparotomy Delmore squeezed the gallbladder to see if it emptied properly and twenty-four hours later the patient developed an acute pancreatitis.

The diagnosis of acute pancreatitis should be made preoperatively more often than it is. Most of these patients that I have seen stated that the attack of acute pancreatitis was

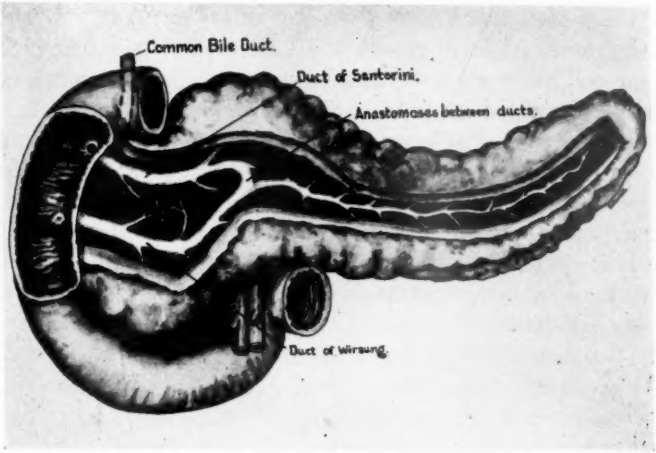

Fig. 408.—Drawing from specimen removed at postmortem. Note the stenosis of the duct of Wirsung with large anastomosis between the ducts of Wirsung and Santorini, and the distention of the duct of Santorini to the same size as the duct of Wirsung.

different from any previous attack. There is a difference in the type of pain. Further on examination of the abdomen there is a difference in the tenderness. In gallbladder disease tenderness is found over the gallbladder area and is aggravated when a finger is hooked under the liver and the patient is asked to take a deep breath. In ulcer of the stomach or duodenum, the tenderness is most marked at a single point, but in acute pancreatitis there is tenderness extending transversely across the abdomen.

This tenderness is present early. Later, when the abdomen has become distended and somewhat rigid, it is more difficult to elicit. Recently at the County Hospital I saw a patient with an acute hemorrhagic pancreatitis whose abdomen had become distended and rigid before I saw him. At the time I saw him it was impossible to elicit a transverse line of tenderness, but this was due to distention and rigidity of the abdomen. I believe that the line of tenderness would have been found before this distention occurred.

The prognosis of acute nonhemorrhagic pancreatitis is good. Of the 6 cases that I have studied, 5 of my own and 1 of Dr. Livingston's, all have recovered. The results from this type differ radically from those of acute hemorrhagic pancreatitis in which the patients usually die. Patients with acute pancreatitis should be operated upon early. It was a mistake to have waited as we did with this patient, however, the mass was so easily palpable that it did not seem possible that it was a pancreas that we were palpating.

It is possible that acute hemorrhagic pancreatitis develops from the acute nonhemorrhagic type and could be prevented by early operation.

CLINIC OF DRS. EDGAR L. GILCREEST AND THOMAS F. MULLEN

UNIVERSITY OF CALIFORNIA HOSPITAL

TWO CASES OF SEPTATE VAGINA, DOUBLE CERVIX, AND DOUBLE UTERUS

WE have seen two such cases during the past few months, upon one of which we have operated.

Such cases are reported to be very rare. We question if they are as rare as statistics reveal. We believe their supposed rarity is due to the ease with which they may be overlooked. If they are rare these cases should be recorded; if not, the reporting of them may aid others in diagnosing such malformations.

Case I.—Mrs. G. B., aged twenty-eight, married, came in complaining of severe backache. Menstruation began at eleven years of age, was always irregular, the flow always profuse, lasting from seven to eleven days and on some occasions eight weeks. Frequently after a cessation of one week she would begin to menstruate again. Her back would always ache a few days before her periods. She remembered having been confined to her bed when thirteen on account of severe backache and pain in the left abdomen. At that time she thought "something ruptured in her left side," after which she felt better. For the past four or five years the backache has increased and the pain in left side has returned. At various times while in college she was treated for dysmenorrhea, but received little relief.

In September, 1928, she was married. Since her marriage her menstruation has become a little more regular, occurring every two weeks and lasting from eight to ten days.

For the past three or four months her back has ached most of the time, and the pain has become more intense. As a result,

she states that she "feels all dragged out." Every time she walks fast or attempts to run she feels a pain over her left ovary.

The general physical examination was essentially negative.

Vaginal Examination.—A septate vagina was seen. The septum was thin and very elastic. The right canal was larger than the left. In fact if the examiner were not very alert the speculum would slip into this canal and the left would not be seen. Indeed, this was what actually happened when we first inserted the speculum. The only thing that made us suspicious was that the cervix, which was of normal size and appearance, angulated to the left instead of being in the midline. Removing the speculum and seeing the septum a smaller speculum was then inserted into the left vaginal canal. This cervix, also of normal size, was tilted toward the right and was eroded.

On bimanual examination, the right uterus could be palpated and was normal in size, the left uterus was retroverted. The left ovary was enlarged and painful on pressure. The right ovary was normal in size.

The diagnosis of double vagina or, to be more accurate, septate vagina, double cervix, double uterus, retroversion of left uterus, and cystic degeneration of left ovary was made.

Operation.—The cervices were exposed and dilated and the uteri curetted. The left uterus contained a thick soft endometrium and the cervix was definitely eroded. On the right, the organ was apparently normal. The septum was then removed by excision and suture.

A midline laparotomy was performed, exposing a double uterus, the halves being equal in size with the urachus passing between the two bodies to the umbilicus. The left ovary was enlarged and cystic. It ruptured during manipulation. Supravaginal hysterectomy was done on the left side, removing the left tube and ovary at the same time. The abdomen was otherwise normal.

Pathologic Report.—Gross.—Left uterus small, about 4 cm. in length, muscle wall firm. The fallopian tube is distorted due to peritoneal bands of adhesions, but is not enlarged. No recent acute inflammation. Ovary large, fibrous, and cystic.

Microscopic.—Sections of the uterine mucosa show thin mucus membrane in which the interstitial tissue is fibrous and the glands are small. Muscle wall normal. Sections of the left tube normal except thickening of the peritoneal coat. Sections of the left ovary show moderate diffuse fibrosis and cystic degeneration of some of the follicles. Sections of curettings from the right uterus same as left. Right uterus not submitted for examination.

Pathologic Diagnosis.—Cystic left ovary. Peritoneal thickening of left tube.

Postoperative Note.—The patient has made a very smooth and uneventful recovery. She has gained steadily in strength and in weight and menstruated twice since the operation, the last menstruation being so painless that she telephoned us that she "was experiencing the first normal period in her life, not having an ache or pain, not knowing that she had a back and never having felt better in her life."

Case II.—A woman nineteen years of age has been married twice. Coitus during the first marriage was very painful. She has never conceived. Menses, which began at twelve, have always been irregular. Several times she has missed a period, and again they have come every two weeks. Recently they have been rather regular. Two days preceding menstruation she begins to have pain through her pelvis which increases in intensity. The flow is free and formerly lasted from four to six days, but recently from four to eight days. Ever since she was ten years old she has had "terrible backache once or twice a week" coming on particularly if she got tired. She has always attributed her backache to an accident which occurred at the age of ten when she fell off a hay wagon. She now complains of constant frontal headache and pain in the back.

Upon examination the vagina was seen to be divided by a septum. The right canal was twice as large as the left. The cervices were rather small, of equal size, and were not eroded. The bodies could be felt on bimanual examination.

Embryology.—The invaginations which form in the perito-

neum covering the wolffian ridge after the mesonephros has reached the height of its development are the beginnings of the müllerian ducts. The forming ducts become disconnected from the peritoneum except at one small point and continue to grow as two solid rods of cells by proliferation of their ends. They acquire a lumen which develops throughout their length.

In embryos of 22 mm. or thereabouts, they have acquired their full length and finally fuse together at their lower ends to form the uterus and vagina, the upper portion remaining separate to form the fallopian tubes.

Various forms of anomaly may occur owing to either imperfect development of the müllerian ducts or various degrees of failure in fusion.

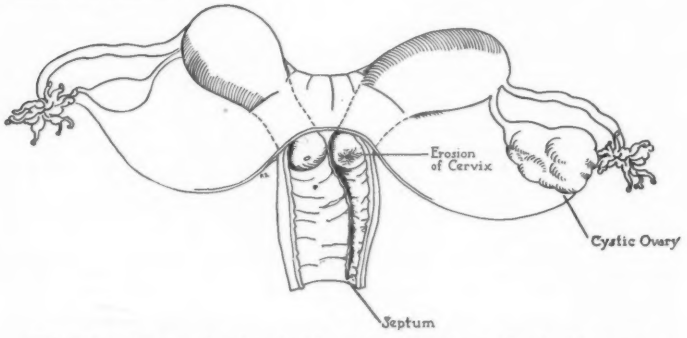

Fig. 409.—Schema showing double vagina, double cervix, double uterus.

The most extreme abnormality due to defective blending of the ducts is double uterus or uterus didelphys in which there are two complete organs lying side by side. Each müllerian duct in this anomaly forms a perfect uterus with cervix and fundus, but with only one cornu, one fallopian tube, and one round ligament.

Either of these uteri may be functionally perfect, pregnancy and parturition may therefore occur normally. On the other hand, either of the organs may be imperforate or rudimentary.

The vagina is formed by the coalescence of the lower portion of the ducts and the absorption of their median walls.

The failure of fusion or of the absorption of the median wall results in the septate uterus which not uncommonly occurs with uterus didelphys.

A complete double vagina having two canals, each opening into an external vulva of its own, is very rare and only this type of malformation can be properly termed a double vagina.

The septate vagina is less rare, the partition seldom dividing the passage into exactly equal halves, coitus being usually confined to one side.

Symptomatology.—The symptoms of this condition may be negligible. It becomes a pathologic entity only when a more or less physiologic function, such as menstruation or pregnancy, is in progress. Indeed, most cases are discovered when the obstetrician is confronted by some difficulty in the termination of pregnancy. When dystocia occurs, it may endanger not only the life of the child, but also that of the mother. It would seem singular that any symptoms the mother may have are seldom attributed to this developmental defect. This condition may be much more frequent than so far recorded, and a woman possessing this malformation may bear children without difficulty and spend her life in blissful ignorance of her condition. However, the uterus didelphys, bicornis, bilocularis, septus, etc., all depending upon the degree of fusion of the müllerian ducts, leave the organs of generation in an imperfect state. Indeed, the appendages of such a uterus or uteri are most always in a state of chronic inflammation and constitute a most fertile field for the invasion of bacteria.

Diagnosis.—In making a vaginal examination if the fingers are inserted at right angles to, rather than in axis of, the vaginal canal one is less liable to overlook this condition. It is interesting to note that in both of our patients the anomaly was overlooked during bimanual examination on different occasions by other physicians. As De Sa has said, "It might be held that a double uterus would easily be detected by the vaginal and bimanual examination, yet, it is a matter for surprise that most of such cases have been detected during operation. The probable explanation is that the gynecologist does not think of such an

anomaly at the time and ascribes what he feels to more common conditions of ectopic gestation or fibroids or tubo-ovarian inflammation."

The diagnosis of the presence of a double uterus is not always an easy matter. If the cervix is single, even lipiodal and radiagrams may cause deception. It is often impossible to differentiate cases of uterus didelphys from the more frequent uterus bicornis.

Not uncommonly this uterine malformation is associated with deformities of neighboring parts, such as ectopia vesicae and atresia ani.

Inasmuch as the diagnosis was obvious in our operative case we believed it inadvisable to inject any opaque substance or to resort to the Rubin test.

Treatment.—A simple plastic procedure on the vagina will restore the normal anatomy of the canal.

In double uterus hysterectomy of the more imperfectly formed uterus is advisable. In the event that the uteri are of equal size and development, then the one, the site of a diseased process or associated with pathology in the adnexa, should be removed.

Various procedures for the removal of a uterine septum or the correction of a bicornate uterus have been advocated. In the event that it seems advisable to conserve the organ these operative procedures may be utilized. In certain instances in which it is inadvisable to remove the organ the complications incident to pregnancy may be obviated by operative sterilization.

Pregnancy in a double uterus, Epstein and Goldberg maintain, should be treated as a nonruptured ectopic, by emptying the uterus and correcting the maldeveloped organ. These authors emphasize the necessity of being prepared for a severe postpartum hemorrhage and for a stormy convalescence.

Although text-books consistently repeat the statement that women with anomalies of the uterus are usually sterile, Dannreuther states that a survey of current periodical literature, as well as his personal experience, proves quite the contrary.

Munro Kerr in his review of the literature states that Guerin Valmale investigated 46 cases of uterus didelphys and found labor was seldom complicated.

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CLINIC OF DR. W. B. HOLDEN

UNIVERSITY OF OREGON MEDICAL SCHOOL

CONTRASTING CLINICAL FEATURES OF ABSCESS OF LIVER AND SUBPHRENIC ABSCESS. ILLUSTRATED BY TWO CASES OF EACH IN THE HOSPITAL AT THE SAME TIME

MULTIPLE abscess of the liver in my experience has fortunately been rare, having seen only 3 cases. Subphrenic abscess is more frequent. Either condition may follow disease or operation on the stomach, duodenum, gallbladder, and especially the appendix. Multiple abscess of the liver is a portal pyemia. A septic thrombus in a branch of the portal vein is the source of the pathology. Gangrenous appendicitis, operations on the intestinal tract, inflamed hemorrhoids, operations for hemorrhoids, daily offer thousands of opportunities for septic portal thrombosis. However, we infrequently see multiple abscess of the liver. Subdiaphragmatic abscess may be located in front or behind either the right or left lobe of the liver. Since the ruptured appendix and perforating ulcer of the duodenum are common etiologic factors, abscesses around the right lobe are much more frequent. Multiple abscess of the liver is quite uniformly fatal. Subphrenic abscess is amenable to surgical treatment. Hence it is essential to differentiate clinically these two serious liver complications. The following 2 cases are offered to make this distinction outstanding.

Mrs. H., aged thirty-eight, was operated October 3, 1928, for gallstones. She had recovered from an attack of acute colic one week before. A cholecystectomy was done, three cigaret drains were placed in the bed of the gallbladder. Pathologic diagnosis was subacute cholecystitis. The first week of the convalescence was a little more stormy than the average. Tempera-

ture 98 to 100 F., pulse 110 to 120. Second week, temperature was 100 to 102.5 F., pulse 120 to 130. There was some bile leakage. Patient had severe pain in right side of abdomen.

For several weeks, patient had temperature from 99 to 101 F., some periods for a few days, temperature would remain below 100 F. Pulse was constantly rapid. She complained of pain and tenderness over her liver. November 4th, the *x*-ray showed some fluid at the base of right chest, and a small amount of clear

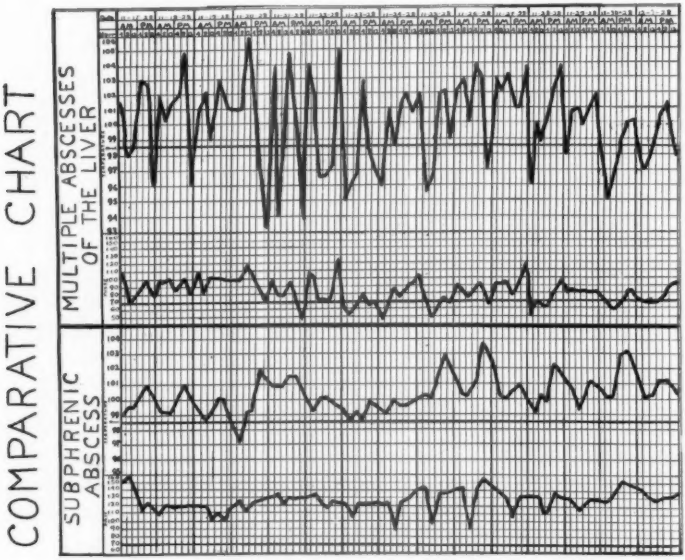

Fig. 410.—Temperature and pulse chart.

fluid was aspirated. There was no change in patient's condition. November 16th, an exploration for subphrenic abscess was done. An incision was made in right axillary line under ribs, but no pus was found. The original gallbladder wound was reopened and a little pus was found in the gallbladder bed. Cigaret drains were used. Temperature and pulse remained high for the next four weeks. *x*-Ray of chest and physical examinations were repeated. The patient gradually looked worse, tem-

perature and pulse a little higher. We believed we were dealing with a subphrenic abscess. We apologetically used large aspirating needles on two different occasions to locate the abscess, but found none. Repeated urinary and blood examinations were of no significance. December 20, 1928 we exposed the diaphragm by an incision between the ribs and opened a small subphrenic abscess, containing a few ounces of pus. Gauze drain was used. The incision in the anterior chest wall was made at a point that had previously been determined as most tender. Pleuritis had isolated the pleural cavity at this point. The patient's temperature dropped to normal and so remained. January 1, 1929, she left the hospital in good condition. She never had chills. The fever was constantly above normal and pain was present until the subphrenic abscess was opened.

Mr. E., aged forty-five, was operated on October 13, 1928 for a gangrenous appendix. The history of acute appendicitis was classic, except for repeated chills twelve hours before operation. We are inclined to regard chills in appendicitis as indicating that the infection has extended beyond the appendix. At the operation, attention was called to the history of chills and the possibility of serious complications of some sort were suggested. Convalescence the first ten days was a little troublesome, due to infection in the abdominal incision. There was moderate fever and slight abdominal tenderness. The edges of the skin were separated, a small amount of pus escaped. However, temperature and pulse and general condition of patient did not improve.

Twenty-one days after surgical operation patient had a severe chill with temperature going to 103 F., sweating and subnormal temperature in a few hours. Chills, high fever, sweats, and subnormal temperature at irregular hours were daily experienced for the next eight weeks until death. A few times for two or three days the temperature would not go above 101 F., and the chills would be light. At other times there would be two severe chills in twenty-four hours with a temperature range of 105.8 to 93.2 F. in a few hours. Variations of 10 degrees in temperature within six hours were noted several times. There

was no pain and practically no tenderness over the abdomen or liver. There was some emaciation and great weakness. The last week or two of life there was slight icterus. The pulse remained relatively good, and did not vary in rate to correspond with the temperature. A few days after the onset of the chills a definite diagnosis of multiple abscess of the liver was made. Numerous consultants concurred in the diagnosis.

In one previous case of multiple abscess of the liver, we had employed mercurochrome (1 per cent) intravenously with a cure. This case we reported in detail in SURGICAL CLINICS OF NORTH AMERICA, October, 1924. With the above case as a guide, we determined to give mercurochrome a thorough trial. Between November 10th and December 21st, 300 cc. of 1 per cent mercurochrome were given intravenously—20, 25, and 30 cc. at a time. No appreciable effect on the patient was noted. Daily examinations of the urine were made. On entrance, there was .2 per cent albumin in the urine, it varying from .06 to .3 per cent during his entire sickness. Casts were present in small numbers in most of the specimens, but the mercurochrome did not change urinary findings in the least. The blood picture was consistent with the infection—leukocytosis and finally grave anemia.

Autopsy showed old septic thrombus, occluding iliocolic vein, multiple abscesses of the liver. Liver weighed 2700 grams. The liver substance was nearly displaced by abscesses of all sizes from microscopical to one large enough to hold 6 or 8 ounces of pus. One small abscess in the left lung indicated that the liver had fairly well succeeded in segregating the septic process. The marked parenchymatous degeneration of the kidneys could be due to the long infection of two and a half months, with mercurochrome as a possible factor. However, the patient never showed any signs of mercurial poisoning.

We show only two weeks of the comparative temperature and pulse charts in these 2 cases. The "sawtooth" "steeple" temperature curves, with sudden great variations of the multiple abscess of the liver, contrast strongly with the more continuous and constant curve of the subphrenic abscess.

To summarize:

Multiple Abscess of Liver	*Subphrenic Abscess*
Complicates disease or operation on gallbladder, stomach or intestinal tract.	Same.
Severe chills at irregular intervals.	No chills.
Profuse sweating, irregular, high fever, and sub-normal temperature.	No drenching sweats, temperature continuous, and only occasionally slightly below normal.
No pain.	Much pain.
Very little or no tenderness.	Considerable tenderness.
Prognosis quite hopeless.	Prognosis fairly good if abscess is drained.

CLINIC OF DR. EMILE F. HOLMAN

FROM THE DEPARTMENT OF SURGERY, STANFORD UNIVERSITY MEDICAL SCHOOL

THE TREATMENT OF PERSISTENT PAROTID FISTULAE BY AVULSION OF THE AURICULOTEMPORAL NERVE. REPORT OF TWO CASES

ACTING upon a suggestion contained in the physiologic writings of that highly original thinker, Claude Bernard, Rene Leriche[1] in 1914 avulsed the auriculotemporal nerve for the cure of a parotid fistula following a knife wound of Stenson's duct. Since that time several writers[2, 3] have corroborated Leriche's observation that such fistulae may be controlled by interruption of the secretory fibers reaching the parotid gland by way of the auriculotemporal nerve.

The parotid gland receives secretory nerve fibers from two sources, the cerebrospinal and sympathetic systems. Briefly the course of the cerebrospinal secretory fibers is supposed to be as follows: Originating in the nervus intermedius, the fibers accompany the glossopharyngeal nerve to the tympanic plexus. Hence the fibers are carried by the Vidian nerve to the otic ganglion, and from this ganglion by a communicating branch to the second division of the fifth nerve and thence by way of the auriculotemporal nerve to the parotid gland.

The sympathetic fibers to the parotid gland issue from the spinal cord by way of the upper three anterior dorsal nerve roots, thence to the stellate, inferior, and superior cervical ganglia. From the latter ganglion, a fresh relay of nonmedullated fibers travels on the walls of the branches of the external carotid artery to the parotid gland (Starling).

Stimulation of the cerebrospinal fibers is said to provoke a

copious thin, watery saliva, whereas stimulation of the sympathetic fibers produces a thick, viscid, and scanty saliva. Elimination of the copious watery secretion by section or avulsion of the auriculotemporal nerve will permit a fistula to close.

The nerve is approached through a vertical incision 3 cm. long lying in front of the ear. The vertical portion of the temporal artery is exposed first. Parallel and behind this artery runs the extraglandular part of the nerve distal to the gland. The nerve is then followed centrally and about 4 to 5 cm. of the nerve isolated with division of the fibers entering the gland. The central end is slowly avulsed. Points of particular importance in the course of the operation are, first, to seek the nerve just *posterior* to the temporal artery, not medial or deep to it, and second, to isolate the central and deep portion of the nerve so as to secure all branches to the gland, otherwise secretion may recur. Secretion may continue for several days and then gradually cease.

The operation is only intended when other operations are not indicated. Immediate wounds of Stenson's duct should be repaired by resuturing the duct or by stitching the central end to a new opening in the inside of the cheek. Treatment with the *x*-ray may dry up the secretion of a gland and therefore cure a fistula, but the danger of fibrosis and possible interference with the functioning of the facial nerve which passes through the gland is presented by *x*-ray therapeutists as a contra-indication to its use.

The following cases illustrate the application of the operation of Leriche:

Case I.—M. B., a laborer, sixty-six years of age, admitted to Lane Hospital September, 1929, complained of an ulcer of the right face of twenty-two years' duration. Two previous incomplete treatments with radium in 1921 and 1923 had failed to heal the ulcer. On this admission, there was a large ulcer over the right zygoma, $4\frac{1}{2}$ by 2 cm. in diameter, with paralysis of the upper branch of the facial nerve and partial destruction of the zygoma. The ulcer was excised with a cautery together

with a part of the zygoma. The wound was subsequently epithelialized by the application of seventy-two small, deep grafts to the granulating surface, of which seventy-one grew. During the healing process, however, the patient complained that when eating "water ran off the side of his face." Examination revealed a fairly continuous stream of clear watery secretion coming from a granulating area at the lower border of the wound. While eating, the secretion was greatly increased.

On November 14, 1929, the operation as described above was performed, though rendered quite difficult by encountering considerable scar tissue just anterior to the ear. About 1 inch of the nerve was removed. During the first few days the secretion continued, but in constantly diminishing amounts, and by November 19th the salivary secretion had entirely ceased. A note on December 4th stated that no salivary fistula remained, and that healing was almost complete.

Case II.—C. M. V., aged fifty-six, entered Lane Hospital February 12, 1929, with an extensive carcinoma of the floor of mouth invading the anterior base of tongue as well as the jaw. At operation, the entire tongue and the jaw from angle to angle were removed together with glands down to the bifurcation of the carotid artery. A stormy but gradual recovery occurred, and in January, 1930, he returned stating that he wished to resume his work as cobbler, but that he was prevented from doing so by the profuse salivary secretion which dripped constantly from his mouth in a thin, watery stream, particularly profuse and annoying when he tilted his head slightly forward. Examination showed that most of this secretion was coming from the parotid duct orifices at the rate of a drop a second, suggesting at once the possibility of reducing the amount of bilateral resection of the auriculotemporal nerve.

Accordingly, on January 18th, the auriculotemporal nerve was avulsed on both sides with fair ease. Within twenty-four hours the secretion was much reduced and within forty-eight hours the mouth appeared to be quite dry. The patient himself stated that the secretion was not only less, but the little

that appeared seemed to be much thicker in consistency. The diminution in secretion has continued to the present time.

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CLINIC OF DR. JAMES R. JUDD

QUEEN'S HOSPITAL, HONOLULU, T. H.

THREE UNUSUAL MANIFESTATIONS OF INFECTION OF THE LYMPHATICS

DURING the past few years there have come under observation 3 cases of infection of the lymphatic system presenting many points of interest as to their rarity, pathogenesis, diagnosis, and treatment.

Case I.—Elephantiasis, caused by the Filaria, is endemic in Samoa, Fiji, and other islands of the south Pacific. The Hawaiian Islands have always been free from this disease. There have been a few cases of elephantiasis reported here, but in these instances the disease has been contracted in foreign parts.

The arrival of a patient at the Queen's Hospital, Honolulu, presenting the appearance as shown in the illustrations, was the occasion of surprise and speculation as to whether we had to deal with elephantiasis tropicum due to the Filaria bancrofti or with the so-called "elephantiasis nostras streptogenes."

The man was a native Hawaiian, thirty-six years of age, who has lived all his life in an isolated district on the island of Hawaii. He has never been to school and his mentality was so poor that it was impossible to obtain an accurate history. Following whooping cough in childhood he has never been able to walk without assistance. About the age of fifteen years a gradually increasing swelling of the scrotum was noticed. About this time abscesses appeared in the neck, axilla, and groins and discharged pus off and on for several years. The scrotal tumor continued to increase in size, but on account of fear and ignorance no attempt was made to better his condition. Finally, after the tumor had been growing for twenty-one years, he was

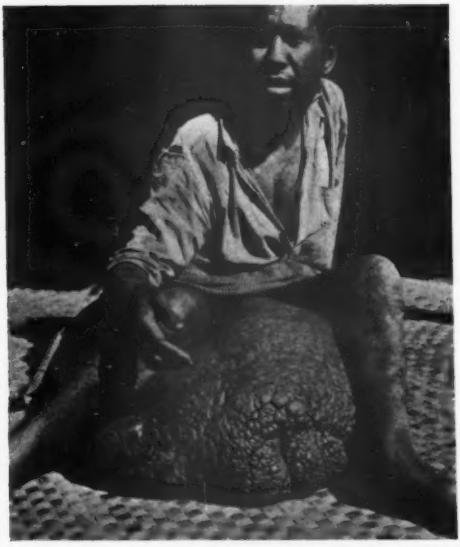


Fig. 411.—Mammoth scrotal tumor weighing 98 pounds. Urine dribbles from sulcus showing on anterior aspect of tumor near patient's left foot.

Fig. 412.—Patient supported in erect position, showing lower end of tumor extending well below knee.

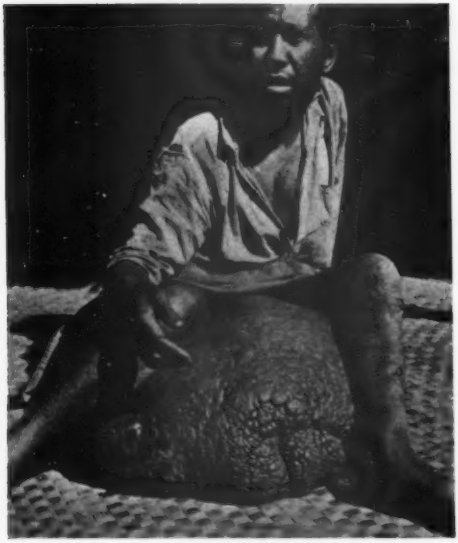
discovered by Dr. Warren White of the Shriners Hospital, who arranged his transportation to Honolulu.

The photographs illustrate the condition better than a description. The longitudinal circumference of the tumor was 6 feet, 5 inches, the transverse circumference was 4 feet, 6 inches. The skin was much thickened and furrowed, especially at the most dependent portion, and thinner and approaching normal as it neared the body. The sheath of the penis was incorporated

Fig. 413.—Posterior aspect of tumor showing bulk almost equaling weight of patient.

in the scrotal mass, and the urine dribbled from a crypt formed by the prepuce being drawn in and inverted as shown in the illustration. The mass was firm on palpation with areas of fluctuation present. Skin sensation was not impaired. There was a strong mawkish odor. As a precautionary measure the presence of any coils of intestine in the mass was eliminated by *x*-ray photographs following a barium meal.

There was a corneal opacity with blindness of right eye. The



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There was a corneal opacity with blindness of right eye. The

leg muscles were atrophied with partial flaccid paralysis and loss of reflexes. These symptoms were ascribed to syphilis. The neck, axillae, and groins showed numerous scars. The scars of the inguinal regions were especially prominent.

Repeated blood examinations showed no filaria. The Wassermann reaction was 4 plus and there was a marked secondary

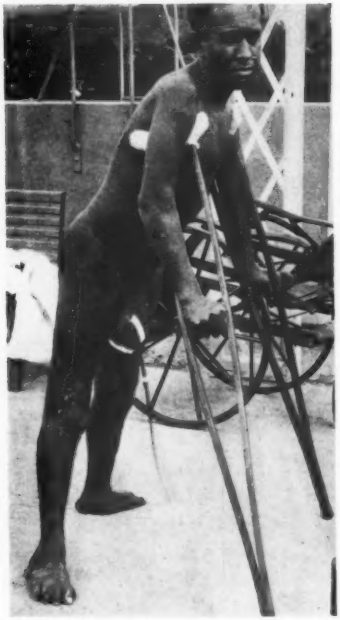

Fig. 414.—Six weeks after operation; patient is learning to walk with crutches.

anemia. No eosinophilia was present. The urine showed albumin and pus.

The weight of the patient was 215 pounds. It was estimated that the tumor weighed almost as much as the rest of the patient. The problem was how to separate the tumor from a sickly, syphilitic body without a fatal outcome. A month was given to preparation. Antisyphilitic treatment was instituted with good

feeding and efforts were made to cleanse the skin of the tumor with hot water and green soap.

The operation of excision was performed almost entirely under local infiltration anesthesia of 0.5 per cent novocaine. A small amount of ether was given near the end of the operation when the patient showed signs of shock and speed was necessary. The tumor was made up of vascular connective tissue with little pools of fluid scattered throughout. Manson aptly describes these tumors as "a mass of lax, blubbery, dropsical tissue in which testes, cord, and penis are embedded." Only

Fig. 415.—Photograph taken from a "movie" film four years after operation.

one testicle and cord were present. The penile urethra was 16 inches long. The tissue was very vascular and every clamp in the surgical department was in use. During the operation hypodermoclysis of normal saline solution was maintained and the patient was encouraged to drink water and, in fact, drank eight glasses. Considerable shock developed at the end of the operation, but the patient responded well to treatment and made a good operative recovery. Two days after the operation the patient weighed 117 pounds, thus making the weight of the tumor

with its fluid contents approximately 98 pounds, a sum within 19 pounds of equaling the entire body weight.

On account of the poor condition of the patient no attempt was made at the operation to re-form the penis. The flaps were sutured together with drainage and a catheter was inserted into the bladder. Six months later when the patient had received a course of antisyphilitic treatment, had gained 30 pounds and was walking with crutches a plastic operation was performed. Urinary control was not regained for several months, but when patient was discharged from the hospital eight months after admission good control was present.

Microscopical examination by Dr. G. A. Batten. The sections examined are made up largely of very loose, poorly cellular connective tissue, composed of many crossing fibrillar bands. In some areas there are numerous blood vessels with thickened walls. There is almost a total absence of fat, only a few scattered fat cells being found in one of the sections examined. The surface is covered with a very thin, black pigmented squamous epithelium. The papillae are low and fine. There is marked round cell infiltration beneath the epithelium elsewhere throughout the tissue.

Was this a case of filaria? As filaria does not exist in this group of islands and our nearest filaria neighbors are several thousand miles away, it is not likely. Besides the man lived all his life in an isolated district where a case of elephantiasis has never been seen. The absence of filariae in blood examinations is not significant. According to Manson, it is unusual to find filariae in the blood in elephantiasis as the disease-producing filariae have died or the obstruction of the lymphatics prevents the filariae from entering the circulation.

The numerous scars in the neck, axillae, and particularily in the groin lead us to think that the scrotal enlargement was due entirely to an infective process following blocking of the inguinal lymphatic system.

In the Johns Hopkins Hospital Bulletin, 1921, xxxii, 309, Professor W. S. Halstead has written most interestingly on the swelling of arms after operations for cancer of the breast. He

expresses the conviction that infection is the overlying cause of the swellings when the main lymphatic channels have been blocked by operation. The infection may be so mild as to escape observation. The report is made of a patient who developed a large scrotal tumor after the removal of the lymphatic glands of both groins. Attacks of redness and increased swelling accompanied by constitutional disturbances had occurred once or twice a year and the scrotal mass, although somewhat reduced in size, had persisted for forty years. The clinical and experimental evidence as to the influence of streptococcal infections in the production of elephantiasis has been ably set forth by Matas who is quoted in this article. In order to bring about the hypertrophy of the connective tissue which is the distinctive feature of the true elephantiasic state, the impediment to the lymphatic and venous drainage is not sufficient. Infection with pathogenic organisms, especially those of the streptococcal type, are essential in the production of permanent alterations in the vasculolymphatic apparatus of the skin and its underlying connective tissue.

The following follow-up report is made by a competent observer four years after the operation. The man's general health is good. He suffers from occasional headaches (syphilitic?). It is necessary for him to use crutches. He has full control of his bladder and there is no indication of any recurrence of the scrotal tumor.

Case II.—Pseudocancer of the Colon.—In the medical literature at my disposal very little mention is made of inflammatory tumors of the intestine resembling malignant growths in gross appearance and causing obstructive symptoms. A metastatic tumor, inflammatory in origin, obstructing the sigmoid colon is of sufficient interest and rarity to be brought to your attention.

The patient was a woman forty-four years of age who has always enjoyed good health with the exception of the condition which now brings her to the hospital. Seventeen years ago she underwent a difficult confinement in a mainland city and, as a result of childbirth injuries, has suffered from prolapse of the

rectum ever since. The bowel always protruded after an evacuation to the extent of 2 inches or more, but she has always been able to replace it. She has never been willing to undergo any attempt at a cure.

Three weeks ago she had a painful movement, passed some blood, the bowels became constipated and she had some fever. A fissure in the anal region was discovered and was treated by rest and hot compresses. In three or four days there was so much improvement that she was up and around as usual. She felt perfectly well for two weeks, then she began to have pain in the left iliac fossa and became nauseated. The next day she vomited, had a chill and rise of temperature of 1 to 2 degrees. The symptoms became worse. The lower bowel was cleared out by enemata, but no further evacuation of gas or feces was obtained. The increasing tenderness in the left iliac fossa, abdominal distention, persistent nausea, and vomiting all indicated obstruction of the bowel. Rectal and vaginal examinations were negative. There was a moderate leukocytosis with increase of the polymorphonuclear cells. The urine showed a heavy trace of albumin and some casts. The exact nature of the obstruction was undetermined but a tumor was suspected.

Laparotomy was performed three days after onset of the acute symptoms. Left rectus incision. Upon opening the peritoneum some cloudy fluid escaped. A large tumor mass was felt in the left iliac fossa adherent to the posterior parietes. With some difficulty the mass was freed and delivered through the wound. It was then seen to be a tumor of the sigmoid colon involving 6 inches of the bowel as illustrated in the drawing. The mass was hard and irregular and the surface and adjacent bowel was inflamed and covered over with a thin layer of pus. The size was that of a large clenched fist. The bowel was apparently completely obstructed. From all appearances we believed that we were dealing with a malignant growth with infection. Fortunately the sigmoid was long and the condition of a longstanding prolapse favored the withdrawal of 10 inches of colon outside of the abdominal cavity. On account of the local peritonitis present no attempt was made to suture the two limbs

of the bowel loop together. The bowel was maintained in position by a Ward stitch placed at the central part of the wound and the extremities of the incision were closed up to the bowel wall.

Convalescence was stormy and vomiting continued. However, a little gas was passed on a few occasions since the bowel occupied this new position. On account of the infection present the bowel was not opened until the fourth day. The puncture wound made by the cautery proximal to the tumor gave exit to the gas and some feces and the vomiting ceased. On the eighth day following the operation 6 inches of bowel was excised with the cautery, leaving at least $1\frac{1}{2}$ inches of each termination of the bowel projecting beyond the skin surface. The bowel wall at the site of division was $\frac{5}{8}$ inch thick. Satisfactory improvement followed this procedure, much nourishment was taken, and free evacuations escaped through the colostomy opening. In order to encourage the two limbs of the loop to come together as the thickening of the bowel subsided, a gloved finger was inserted daily in each lumen of the bowel openings and the fingers approximated.

Four weeks following the original operation a number of large hemorrhoids were removed with the cautery and a clamp was placed in the bowel lumen with one blade in each limb. This clamp cut its way through the spur in seventeen days and the bowels began to move naturally. The patient was allowed to return home and returned in two months for closure of the colostomy. The artificial anus had contracted down to the size of a quarter of a dollar, and it was a simple matter to free and suture the bowel and close the abdominal wall. As a precautionary measure, a $\frac{3}{4}$ inch rubber tube was inserted through the rectum past the colostomy opening for a few inches and allowed to remain in position for four days. This allowed bowel contents to escape by tube and relieved the suture line of undue strain. The wound healed by primary union, and the patient returned home on the seventh day. The prolapse which had existed for so many years was definitely cured by the drawing up and fixation of the colon to the abdominal wall.

Microscopical examination of the mass showed a marked increase in fibrous tissue with purulent inflammation and areas of degeneration. There was no evidence of malignancy or tuberculosis.

Summary.—Intestinal obstruction was caused by a metastatic inflammatory tumor mass of the sigmoid colon secondary to an infected lesion of the anal region.

The lower end of the inflammatory tumor was 10 inches from the anus and probably originated by extension of the infection by way of the lymphatics.

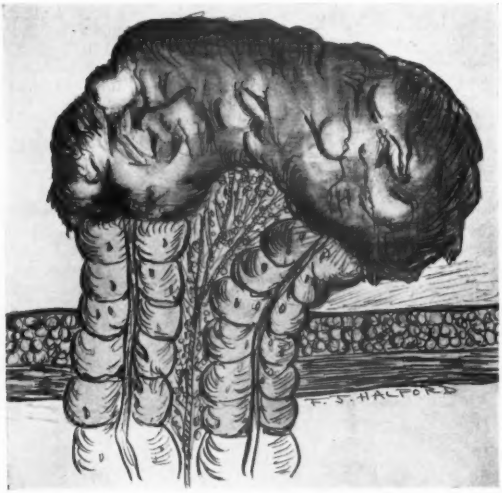

Fig. 416.—Drawing showing appearance of tumor of sigmoid after bowel was withdrawn from abdominal cavity. The tumor was considered to be malignant until it was proved otherwise by microscopical section.

The gross appearance of the tumor resembled that of a carcinoma with localized peritonitis.

The condition was treated by time-honored, conservative methods based on the Paul-Mikulicz principle with a favorable result and the prolapse of long standing was cured at the same time.

Case III.—Metastatic Subhepatic Abscess Subsequent to Ischiorectal Abscess.—Abscess formation in the inguinal lymphatic glands following infection of the genitalia or the lower extremities is fairly common. We see a good many inguinal glandular abscesses in children. Owing to our mild climate, many children go without shoes and their feet are subject to trauma and mild infections. Often an inguinal abscess will de-

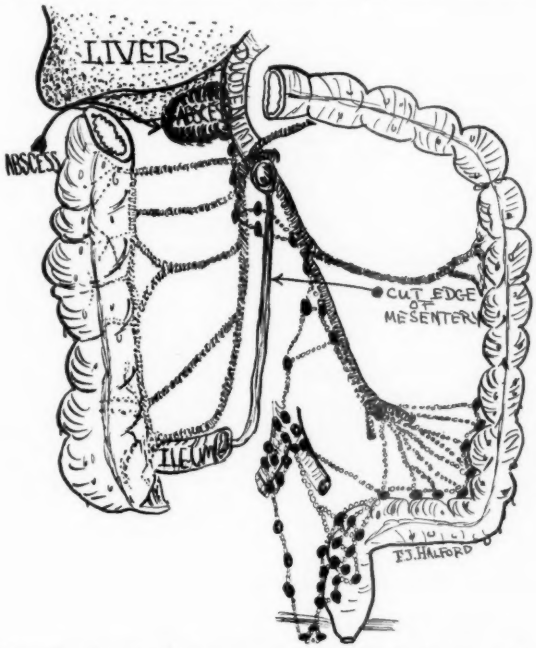

Fig. 417.—Drawing showing arrangement of lymphatic tracts leading from rectal region to metastatic subhepatic abscess.

velop from an insignificant lesion of the foot that has entirely healed. The suppuration may not appear for a period of from one to three or four weeks after receipt of the original injury. Axillary abscess occasionally appears following infections of the hand or arm, but is not as common as the inguinal variety. Adenitis of the cervical glands is a common accompaniment of

throat infections in children. About 40 per cent of the swellings result in suppuration.

We have seen in the last case reported that a metastatic inflammatory process of the sigmoid colon resembling a neoplasm resulted from a lesion in the rectum, the infection apparently traveling by the lymphatics. Suppurative processes in the liver are known to follow infected hemorrhoids due to the entrance of septic thrombi into the portal circulation. Considering the prevalence of rectal infections and the possibilities of extension of infection by way of the lymphatic system, it is remarkable that suppurative adenitis of the abdominal lymph nodes occurs so rarely.

According to the researches of Charpet, Cunneo, Miles, and others the lymphatics from the rectum traverse the pararectal glands and pass to the glands in the sigmoid mesocolon. The efferent lymphatic from the latter terminate in the pre-aortic glands. A pyogenic subhepatic abscess resulting from an infection of the glands is of sufficient rarity to make the following case report of interest.

The patient was a woman fifty-seven years of age who had always enjoyed good health. A small pararectal abscess appeared rather suddenly without known cause. Under ethylene anesthesia the abscess was incised, discharged for a few days, and had entirely healed in twelve days. She was up and about for two weeks and felt perfectly well when she began to lose her appetite and have some pain in the right side of the abdomen. She was quite sure that she had appendicitis. On examination there was tenderness on deep pressure over the extremities of the tenth and eleventh ribs on the right side with muscle spasm. One to two degrees of fever was present and a moderate leukocytosis. A perinephritic abscess was suspected although the area of tenderness was more anterior than the usual location of such conditions. The symptoms progressed for a few days. There was distaste for food, increased fever, and leukocytosis and more pain and tenderness. The patient finally consented to enter the hospital for operation.

Gas and oxygen anesthesia. A long, high McBurney incision

was made. No pus was encountered in the muscle spaces. The peritoneum was opened and the colon exposed. The appendix was normal and was not removed. Exploration posterior to the transverse colon revealed a hard, firm mass the size of a large orange. The mass was directly under the right lobe of the liver, behind the colon and anterior to the vertebral column to which it was fixed. No fluctuation could be elicited on account of the thick wall. An aspirating needle was used and thick pus discovered. The field was packed off and the abscess cavity opened with a clamp and about an ounce of thick pus evacuated. The finger in the abscess cavity could now feel the aorta in the posterior wall of the cavity. A rolled rubber tissue drain was introduced and the great omentum arranged so as to wall off the drainage tract from the general peritoneal cavity.

The patient was promptly relieved of her symptoms and made an uninterrupted recovery. Drainage persisted from the tract for a period of eight weeks. Healing was promoted by the daily use of sun baths.

Culture from the pus in the abscess showed hemolytic staphylococci.

Summary.—Abscesses of cervical, axillary, and inguinal lymph nodes following infection of the distal lymphatics are fairly common.

In spite of the frequency of infections of the rectal region, metastatic abscess of the abdominal lymph nodes is a rare occurrence.

CLINIC OF DR. MAURICE KAHN

GOOD SAMARITAN HOSPITAL, LOS ANGELES, CALIFORNIA

ENDOGASTRIC MYOMA

BENIGN tumors of the stomach are rare, comprising, according to Eusterman, only about 1 per cent of the tumors of the stomach encountered surgically. They consist of cysts, polyps, lipomas, myxomas, papillomas, angiomas, chondromas, osteomas, myomas, fibromas, and adenomas. Myomas, myofibromas, and adenomyomas are the most common. The endogastric tumors are more frequently encountered than the exogastric. The symptoms of endogastric benign tumors are usually those common to all gastric lesions; if pronounced, strongly suggesting cancer or ulcer, so the differential diagnosis rests largely with the roentgenologist. Now that roentgenologists are becoming more familiar with the *x*-ray signs of these benign tumors. we may expect more frequent diagnoses to be made and a greater number of such non-malignant cases to be reported. So in the future it may be shown that these cases are not so rare as at present appears.

Mrs. M. consulted us on September 16, 1929, and gave the following story:

She was forty-four years of age, had been married twenty-six years, and had five children. Her family history was unimportant. Catamenia began at the age of twelve. Her periods were always regular but scanty. During the past twenty years when she was having repeated attacks of severe hemorrhage the menstrual flow was very slight, but occurred at regular intervals. Four years ago the periods stopped entirely following radium treatment. Her general health, except for hemorrhages, had been excellent. She had had no other illnesses, and no genito-

urinary, cardiorespiratory, or gastro-intestinal symptoms. Her weight had always been around 160 pounds. She lost about 20 pounds after each hemorrhage, but would recover it during the next few months. After her radium treatment her weight went up to 182 pounds.

History.—At the age of twenty-four, that is, twenty years ago, the patient awakened one morning and vomited a very large quantity of bright blood. She had been perfectly well prior to that time. The hemorrhage was very severe. She became nearly exsanguinated and was taken to a hospital in New York City where she remained for four weeks, recovering from acute loss of blood. She was told that she was bleeding from an ulcer and was advised to have an operation, which she refused. She felt perfectly well following this except for weakness. There was no indigestion and no gastro-intestinal complaint. Bowels always moved well. The following year the patient had another severe hemorrhage, but did not vomit. She suddenly collapsed and then passed a black, tarry stool, and was in the hospital two months. From then on for the next eighteen years the patient had very severe hemorrhages on an average of twice a year, and went to a hospital with each attack where she remained for a month or two recovering her strength. She was given a blood transfusion in a New York hospital sixteen years ago following a hemorrhage. During this entire period she had absolutely no pain nor any indigestion, and no other complaints of any kind. She visited most of the prominent clinics in the country, and had several thorough gastro-intestinal *x*-ray examinations. She was told at various places that she had a bleeding ulcer, and also at some clinics that she had tuberculosis of the bowels. The only time she vomited any blood was at the time of the first hemorrhage twenty years ago. All the other hemorrhages were characterized by fainting and by tarry stools. Some of them were very severe, requiring multiple transfusions. During one attack her hemoglobin was below 20. Four years ago she was told that her bleeding was due to vicarious menstruation, and she was given a vaginal radium treatment with the idea of inducing the menopause. Oddly enough, following this

treatment she had no more attacks of hemorrhage for three years except for one very small hemorrhage six months after the treatment. Eight months ago, after having had no hemorrhage whatever for two and a half years, the patient had another very severe attack in which she vomited large quantities of bright blood. She became very pallid and was nearly exsanguinated.

Fig. 418.—Arrow indicates filling defect at cardiac end of stomach.

She was taken to the Good Samaritan Hospital and was under the care of Dr. Cortland Myers.

x-Ray studies made in July and September, 1929, were interpreted as indicating either a lobate tumor or else multiple tumors in the cardiac end of the stomach (Fig. 418). After having viewed the plates my own guess was polypi and an operation advised.

October 3, 1929, she was operated on. The abdomen was opened through a left rectus incision from costal margin to opposite the umbilicus. The stomach was brought into the field and a hard mass felt occupying the cardiac end of the stomach. The stomach was opened through its anterior wall and a tumor

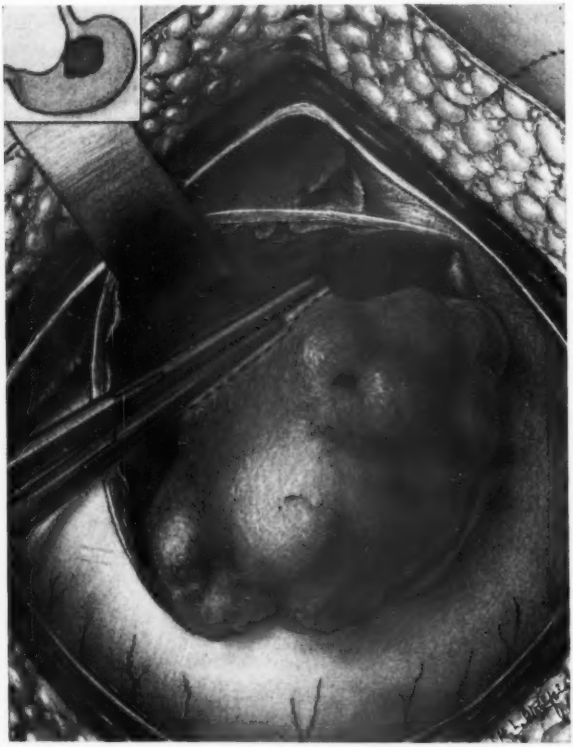

Fig. 419.—Myoma delivered into wound and doubly clamped at its base. Insert shows location of tumor in relation to cardia.

suggesting a myoma was delivered (Fig. 419). Its attachment was along the lesser curvature for about 4 inches, beginning 1 inch below the cardia. The pedicle was clamped and cut. Transfixion ligature of No. 2 chromic gut replaced the clamp (Fig.

420). The opening in the anterior wall of the stomach was triply sutured with chromic No. 0, the first row of sutures including all the coats of the stomach, and the other two the muscular and peritoneal coats only (Fig. 421). The abdomen was closed in three layers, using chromic No. 2 for peritoneum

Fig. 420.—Transfixion ligature of No. 2 chromic gut replacing clamp.

and posterior fascia, chromic No. 2 for anterior fascia, and continuous interlocking horsehair for the skin.

Brem, Zeiler, and Hammack Pathologic Laboratory reported as follows: "Tumor of stomach. Specimen is an oval mass, measuring 11 x 6.5 x 6 cm. The outline is somewhat irregular

and there are several depressions, but no definite ulcerations. The surface is covered by mucous membrane, except a large area over one of the flat surfaces. This oval area of attachment is 7.5 cm. long and 5 cm. wide, at the widest portion. The cut surface is irregularly lobulated, gray, compact, and firm. One or two small, calcified areas are found. Near one end is a hemorrhagic cavity 1.5 cm. in diameter. Microscopic: Sections from the tumor show it to be made up of interlacing bundles of smooth muscle fibres. These are broken up into lobules by

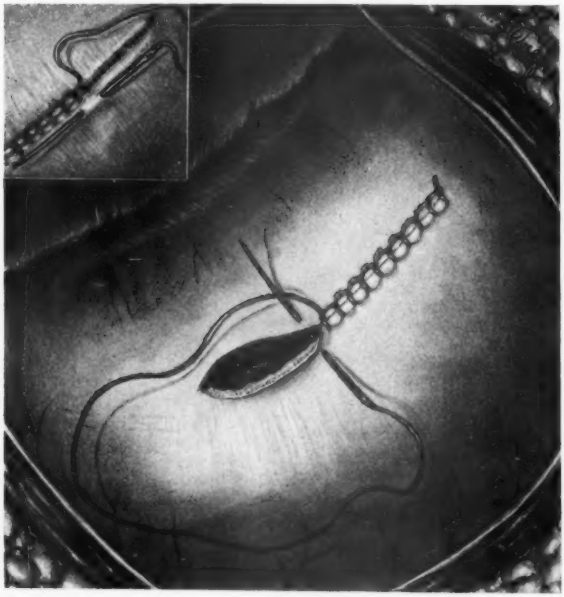

Fig. 421.—Closure of anterior wall of stomach with chromic No. 0.

strands of fibrous tissue. Occasionally areas of hyaline or hydropic degeneration are seen. Blood vessels are numerous. In some areas there is more or less inflammatory infiltration. Diagnosis: Myoma of stomach wall."

Subsequent Notes.—Uneventful recovery.

March 31, 1930. Feels entirely well and is very grateful and happy.

This case is of interest because endogastric myomas are rare and most of them are found near the pylorus, whereas this one was very near the cardia, which probably explains her going twenty years without a correct diagnosis.

CLINIC OF DR. BRIEN T. KING

SEATTLE, WASHINGTON

TECHNIC OF THYROIDECTOMY

THE object of this paper is to present a technic evolved as the result of a personal experience in 1200 thyroidectomies performed in the last six years.

Choice of Anesthetic.—For the patient in good physical condition who has a simple goiter or a mildly toxic adenomatous or exophthalmic goiter, there is little choice between local anesthesia and gas anesthesia combined with local. The very sick patient, with an extremely toxic goiter, who is nervous, is poorly equipped to endure any sort of trauma or pain. The infiltration of the neck with a solution of novocaine cannot be done painlessly in this type of patient. I believe it is bad practice to force these highly nervous patients to undergo operation with local anesthesia, regardless of how skilfully the procedure may be carried out. It is better for this type of patient to administer gas first, and during induction to infiltrate the field with ½ per cent novocaine solution.

Cervical block is an efficient method of anesthesia, but I have discontinued it because of some very unhappy experiences with it. In the first place, it is more difficult to administer; it requires more time and in the few patients on whom I used it, two developed very painful and prolonged attacks of neuritis in the shoulder and arm. As these are the only patients in the total number who developed such symptoms postoperatively, it is assumed that the method of anesthesia was responsible.

I have used amytal very little, and am as yet unconvinced that the advantages gained can outweigh the disadvantages, particularly those in reference to having the patient talk and strain during operation.

Hemorrhage.—Hemorrhage has not been the cause of death in this series of cases. Uncontrollable bleeding has not been encountered, but hemorrhage of a very disturbing nature has occurred on a sufficient number of occasions to enable me to classify certain features relative to cause, location, and control. In general, the size of the vessels varies in direct proportion to the size of the gland. Thus in the large goiters, with large vessels, the more profuse hemorrhages are likely to occur. The location of hemorrhage and the determination as to whether it be arterial or venous are highly important considerations, but only so far as they relate to methods of control.

Anatomical classifications of the location of hemorrhage:

VESSELS
- Superior thyroid artery and veins—at the superior poles.
- Middle thyroid vein—about the middle of the lateral lobe.
- Inferior thyroid artery and ima vein—region of the lower poles or under clavicle.

HEMORRHAGE
- (*a*) Within the gland.
- (*b*) In vessels, outside the gland.

IMMEDIATE METHODS OF CONTROL
- Forceps.
- Pressure with the fingers.
- Packing with gauze.

A safe method of prevention of hemorrhage is better than many transfusions. If, in the early stages of the operation, one will clamp, divide, and ligate the superior thyroid vessels with two suture ligatures; isolate, divide, and ligate the middle thyroid vein and thyroidea imae veins, most of the danger of hemorrhage will have been avoided. There are many minor variations of the normal blood supply of the thyroid gland and, however careful one may be, occasional hemorrhage is unavoidable. As a rule, it is easy to differentiate arterial from venous hemorrhage by the color of the blood. As a principle it is useless to undertake the control of arterial bleeding by packing with gauze, as the intra-arterial pressure is too great to permit the vessel to be collapsed in that way. Intravenous pressure in the neck is very low, rendering the vein readily collapsible. Reducing the foregoing principle to simple terms, arterial hemorrhage requires forceps or strong pressure with the fingers; venous hemor-

rhage may be controlled by forceps, pressure, or gauze packing. The veins of the neck bleed as readily from the proximal as from the distal ends, in fact, I think they bleed more freely from the proximal end. When hemorrhage occurs from the proximal portion of the middle thyroid vein or thyroidea veins, it is frequently a safer procedure to control it temporarily by gauze packing than to grasp blindly with a forceps into a pool of blood. With the hemorrhage thus controlled, the operation should be completed, the gauze removed, and the vessels may then be secured without difficulty.

In moderately large, partially substernal goiters, the veins at the lower pole may become stretched so that elevating the substernal portion of the goiter will cause rupture of the vein due to over-stretching. This may be avoided by clamping and dividing the veins before dislocating the substernal portion.

In the exceedingly friable type of exophthalmic goiter, one may encounter considerable difficulty in controlling hemorrhage from vessels within the glandular capsule, largely because the forceps cut this type of tissue much like scissors. I have met this condition most satisfactorily by rapidly placing forceps on the principle vessels, exposing the outer posterior border of the lobe, passing three or four fingers behind the lobe and by pressing inward and forward. By so doing, hemorrhage is usually controlled. The lobe may then be resected in front of the fingers, while the assistant places forceps on any exposed vessels.

Nerve Injuries.—Injuries to the recurrent nerve in my experience occur more frequently than all other accidents combined. This is true in patients operated on by myself, as well as in those operated on by other men. In the past five years, I have examined the larynges of all patients who consulted me with recurrent goiter. Of those who had been operated upon elsewhere, the yearly number of injuries to one or more of the recurrent nerves has ranged from 20 to 40 per cent of the total number examined. This percentage is higher than it should be. I have never seen a complete paralysis of a vocal cord in an unoperated benign goiter. Lagging of the cord has occurred in a very few benign unoperated adenomatous goiters, but complete

paralysis has only occurred postoperatively and in malignancies. It has not been possible to determine definitely the site of injury to the nerve except in four instances. All of these occurred at the lower pole of the gland. I believe that the chief contributory factors in injury of the recurrent nerve are first, dragging it forward when dislocating the lower pole of the gland; second, including the nerve in a suture or forceps following injury to vessels with hemorrhage at the lower pole; and third, exposure of the lateral wall of the trachea, which requires the later steps of the operation to be done in very close proximity of the nerve. The likelihood of nerve injury will be lessened by carefully clamping and dividing the vessels at the lower pole; by avoiding undue elevation of the gland in this region, and by leaving a layer of tissue along the lateral wall of the trachea.

Little has been said relative to injuries of the superior laryngeal nerve in connection with thyroid surgery. In large exophthalmic or colloid goiters with elongated superior poles, or in adenomatous goiters arising from the superior poles, the nerve may lie in very close proximity to the thyroid gland and thus receive injury during operation. As one of the very important functions of this nerve is supplying the epiglottic reflex, injury to it becomes a matter of great importance. The disturbance of the epiglottic reflex due to unilateral injury to the superior laryngeal nerve is quickly compensated, but injury to both is very likely to result in death from the aspiration of fluids and foreign bodies in the lungs. One of my friends is positive he had, in his practice, a death due to this type of injury.

In connection with the discussion of the epiglottic reflex, I have observed a partial temporary loss of this reflex following injury to a recurrent nerve. It therefore seems reasonable to assume that this nerve supplies the reflex in some individuals. An anatomical explanation of this variation is found in the anastomosing branches and superior and inferior laryngeal nerves.

Injuries to the Trachea.—Should the trachea be accidentally opened, it is a better procedure to insert a tracheotomy tube or preferably a rubber tube, the end of which is placed just inside the trachea and sutured snugly there with fine catgut than to

risk a closure of the opening with the possibility of escaping air or bacteria resulting in serious emphysema or infection. I have not had this unfortunate experience, but saw it occur to one of my friends, who inserted a small rubber tube and sutured it in place. The wound healed without emphysema or infection. Any tube inserted in the trachea should be left in position three or four days to allow for sealing of the tissues to prevent their subsequent infiltration with air.

In the past considerable has been said or written in regard to collapse of the trachea. I do not believe the trachea ever collapses from any other cause than external pressure. Except in cases of malignancy that were inoperable, I have not found it necessary to perform tracheotomy for collapse. In benign goiters regardless of the degree or extent of erosions of the tracheal rings, it has, in every instance in my experience, assumed its normally cylindrical shape following removal of the collapsing pressure. Tracheal collapse is also said to occur in some instances following double recurrent nerve injury with both vocal cords assuming the midline position. A study of the mechanics of this situation will reveal that the collapse is due to a disturbance of the equalization of air pressure within and without the trachea. With the larynx thus closed inspiratory effort creates a partial vacuum in the trachea. The atmospheric pressure on the outside collapses it, much in the same fashion that a rubber tube collapses when a partial vacuum is created in its lumen.

On a number of occasions I have caused a temporary blocking or compression of the trachea, but invariably it resumed its normal contour when the pressure was released. Pressure has been exerted in the following ways:

First, in lifting or dislocating a large lobe, the ligamentous attachments of which have not been divided, may cause a twisting or crumpling of the trachea; second, dislocating one lobe when large adenomata are present in both, may permit a kinking or acute flexion obstruction; third, in removing a large substernal goiter, the trachea may be compressed against the opposite lobe or the first rib; fourth, the weight of many hemostats

when a very vascular goiter is present may compress the trachea. Tracheotomy should not be necessary in dealing with any of the above conditions.

The Parathyroids.—The isolation of the parathyroid hormone by Collip proved a boon for many a goiter patient and a safe retreat for many an harassed surgeon. But parathormone is a poor substitute for normally functioning parathyroid tissue. Next to double recurrent nerve injury, chronic tetany is the most serious and disturbing complication of thyroid surgery.

In this series three patients developed chronic tetany, one of whom died eight months later from angina pectoris, the attacks of which came on synchronously with tetanic contractions in the hands and forearms and were not relieved by parathormone. Following this experience, a study of the parathyroid glands revealed the following interesting anatomical facts: First, that the parathyroids are never intimately attached to the true capsule of the thyroid, that without exception they are situated in the loose connective tissue commonly called the surgical capsule, which surrounds the thyroid; that while they commonly lie in contact with the posterior surfaces of the gland, they may occur at any point on its surface; that they show an especial tendency to lie in contact with the larger vessels of the thyroid from which they receive their blood supply; that in general appearance they are yellowish in color and not easily differentiated grossly from small lobulated areas of fat. From this similarity of appearance, I made a rule that no tissue that resembled fat or parathyroid would either be ligated or removed from beneath the sternothyroid and sternohyoid muscles. Since its adoption, two and one half years ago, I have performed 600 thyroidectomies without symptoms of tetany developing in any patient.

Frequently a parathyroid will be found located in contact with the superior thyroid artery at or just above its junction with the superior pole. In the last 120 cases operated on, I have observed what was grossly identified as parathyroid tissue located at this point in twelve instances.

The element of time is an important consideration in thyroid

surgery, especially in those patients who may be classed as poor operative risks, among whom are the old, the highly toxic, and those who have lost much weight. Forty-five minutes of operative procedure will be well tolerated by most patients, but danger to them will be increased by prolonging the operation much beyond that period.

Technic.—The usual collar incision of medium length about one and one half fingerbreadths above the clavicle, and in a

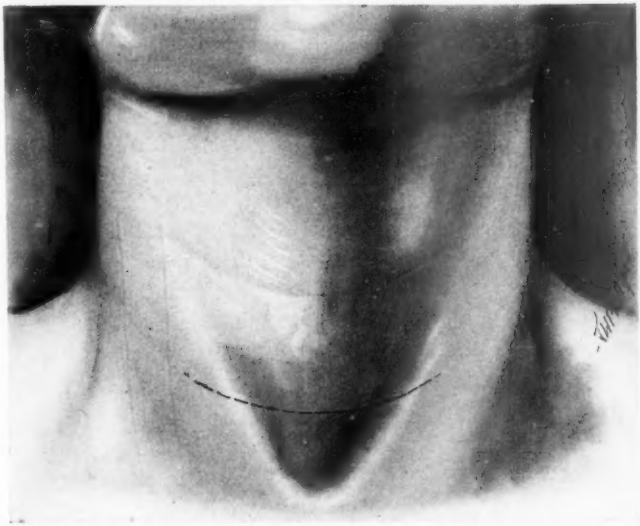

Fig. 422.—Incision of moderate length should be made in the line continuous with the junction of the neck and thorax.

line symmetrical in the individual case with the curves of the neck where it joins the shoulders or trunk, is made. The dissection beneath the upper flap should be carried up to or above the notch in the thyroid cartilage to allow for sufficient longitudinal opening of the fascia between the sternohyoid muscles. Additional exposure may be had in persons with a prominent Adam's apple by extending this incision in a Y-shaped manner on either side of the thyroid cartilage.

It is seldom necessary to divide the muscles, but with large goiters and in case of moderate-sized goiters with long superior poles, additional exposure may be had by so doing. A procedure which greatly facilitates the operation is to remove the surgical capsule thoroughly from the anterior surface and the outer and lower borders. The gland cannot be elevated until this is accomplished. The vessels at the superior pole are clamped and

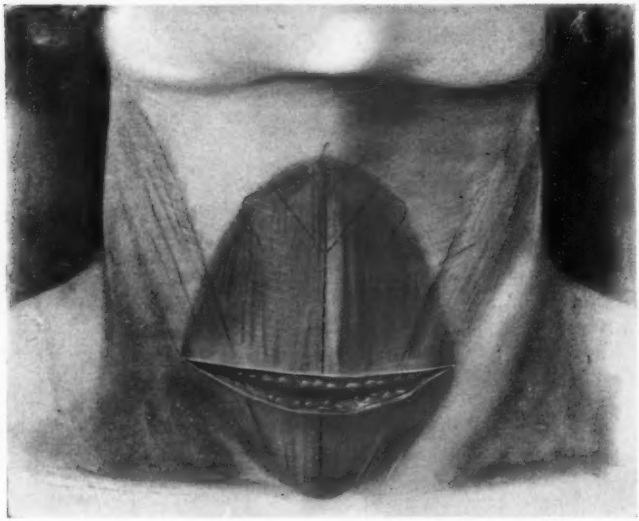

Fig. 423.—It is particularly important that the upper flap be dissected above the notch in the thyroid cartilage to permit sufficient longitudinal opening between the muscles and the fascia.

divided. The middle thyroid vein is isolated, divided between forceps, and the outer end ligated. It is not safe to leave a forceps on the outer end of this vein as the weight of the instrument will often pull the vein apart. The next step is to place the forceps on the vessels along the outer and lower borders of the gland. These forceps serve the double purpose of clamping vessels and outlining the portion of the gland that is to be resected. The isthmus is then divided. The gland may be rapidly resected

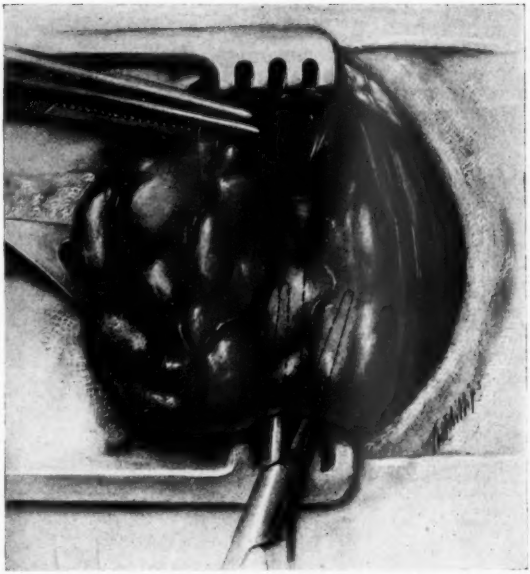

Fig. 424.—Illustrating the separation of the isthmus from the trachea and line of division of the isthmus.

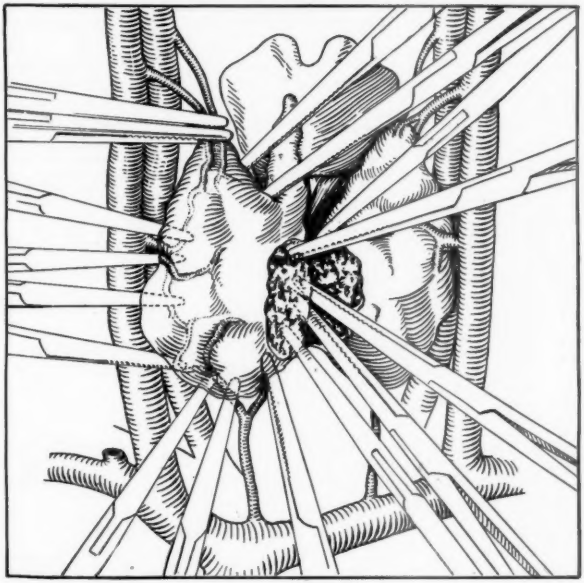

Fig. 425.—Shows the proper placement of the circumferential ring of forceps.

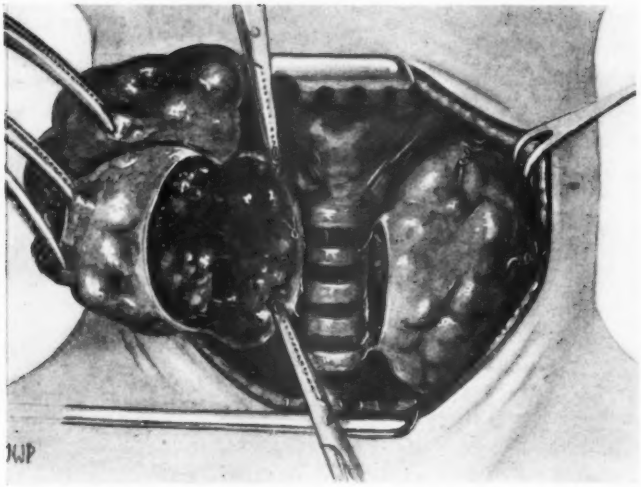

Fig. 426.—Illustrating the resection of the lobe from within outward.

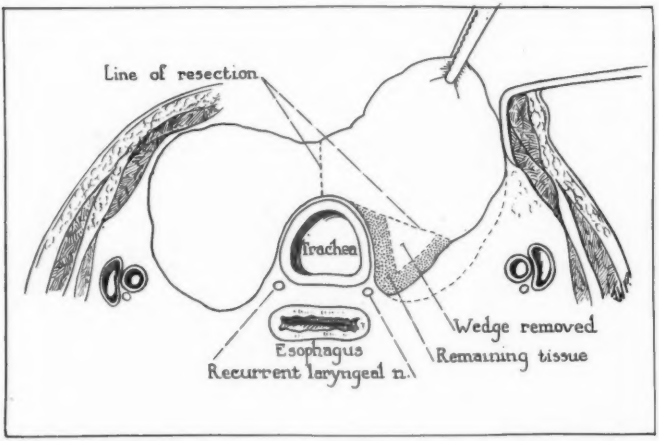

Fig. 427.—Schematic illustration showing plan of resection of lobe and excavation of remaining portion of lobe.

Fig. 428.—Illustrating the wedge-shaped removal of tissue with fingers behind as a guide to prevent cutting through the posterior capsule, endangering the nerve and parathyroids.

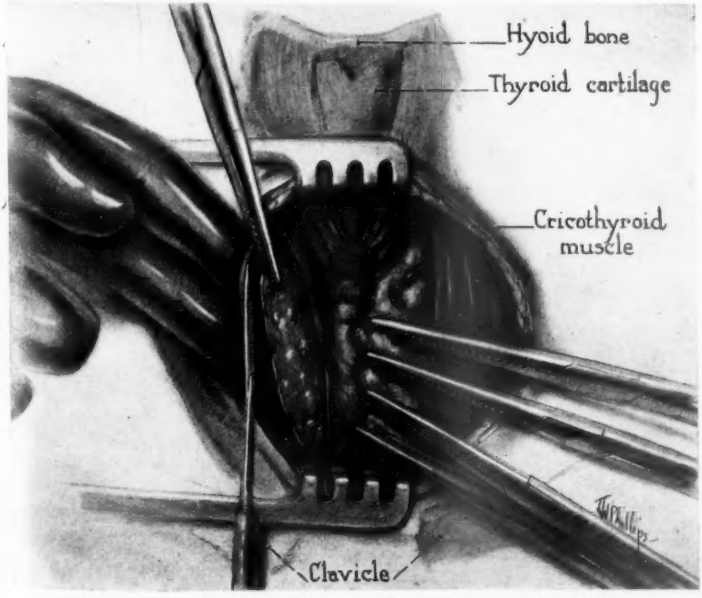

Fig. 429.—Further illustration of wedge-shaped resection of lobe.

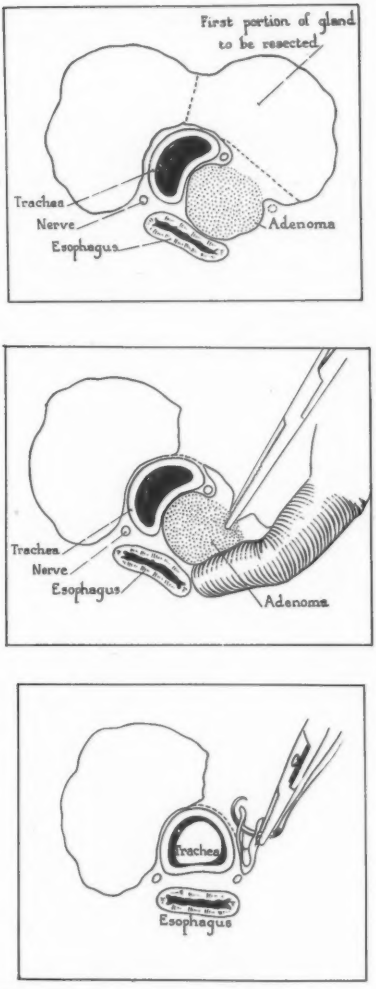

Fig. 430.—Illustrating the frequent situation of small adenoma which should always be removed as illustrated through the cut surface and not by going around on the posterior surface of the capsule.

from the isthmus outward without fear of hemorrhage, if done in a plane just anterior to the circumferential ring of forceps. Two or three fingers may then be placed behind the remaining portion of the lobe and while thus pushing it forward, a wedge-

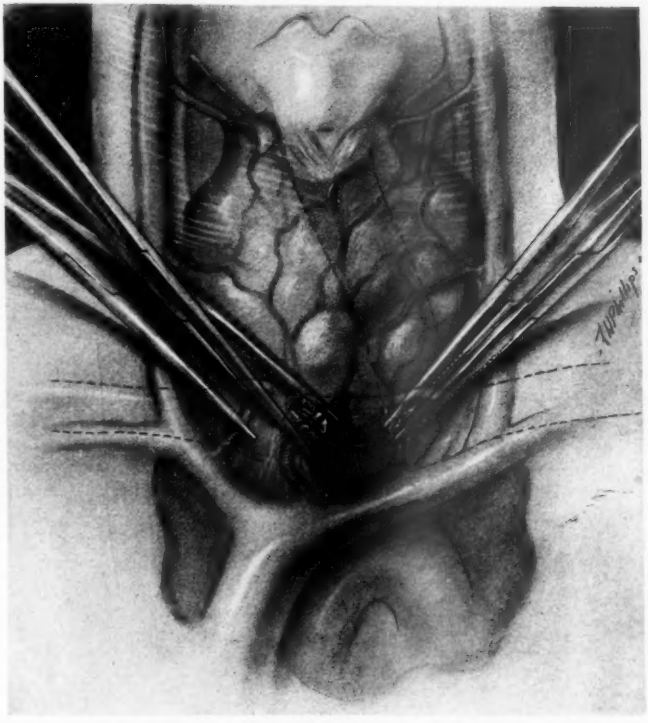

Fig. 431.—In substernal goiters it is very important to divide and ligate the imae veins before dislocating the substernal portion, as the veins frequently are not long enough to stretch over the dislocated lobe and may rupture at the points of junction with the subclavian vein, producing hemorrhage that is difficult to control.

shaped or prismatic-shaped piece of tissue is removed, the fingers acting as a guide to prevent cutting through the posterior capsule. The removal of this wedge of tissue serves two useful purposes: First, it permits the surgeon both by the senses of

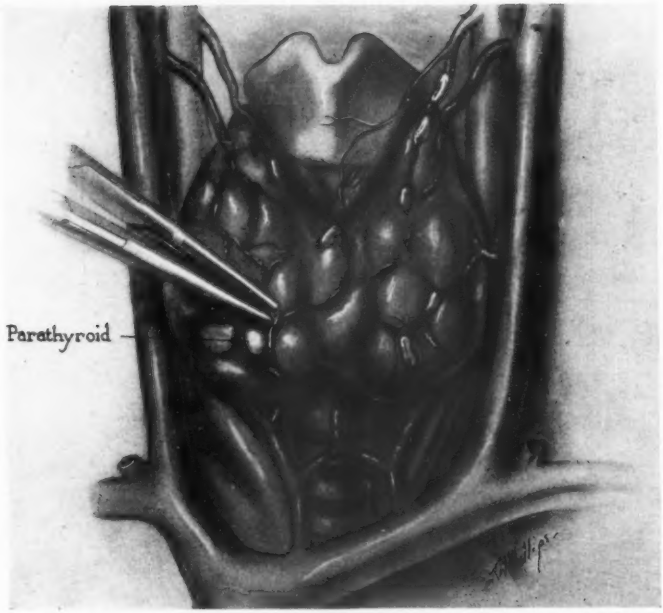

Fig. 432.—Frequent locations of parathyroid on the anterior surface of the gland. Note the parathyroid on the superior thyroid artery near its junction with the superior pole. A parathyroid is normally located at this point in from 15 to 20 per cent of all cases.

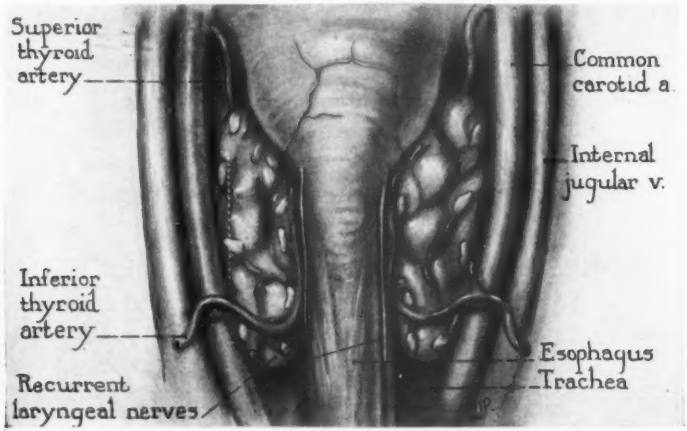

Fig. 433.—Common situation of parathyroids in posterior surface.

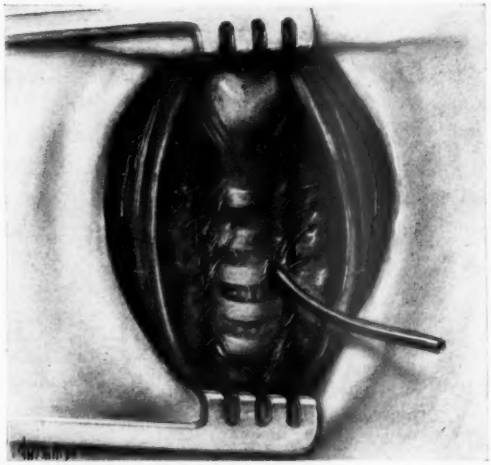

Fig. 434.—If the trachea is opened, it is safe to put a small rubber tube at the end just inside the opening and suturing there with fine catgut. This tube should be left in position three or four days to prevent the wound becoming emphysematous or infected.

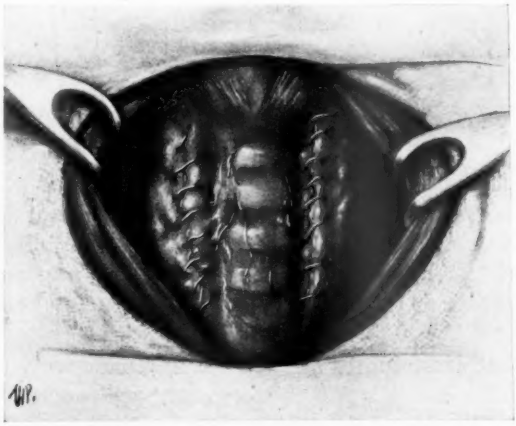

Fig. 435.—Illustrating method of suturing the capsule after wedge-shaped resection. This suture controls practically all the vessels except at the upper and lower poles. Furthermore, by closing the gland in this method there is much less serum in the wound.

touch and sight to estimate the amount of tissue to be left; second, it facilitates the closure of the gland and the complete encapsulation of the remaining tissue. The vessels at the upper and lower poles are then ligated. A double row of running sutures is used to close and re-encapsulate the lobe. These sutures will, as a rule, include all the remaining vessels so that further ligatures are unnecessary.

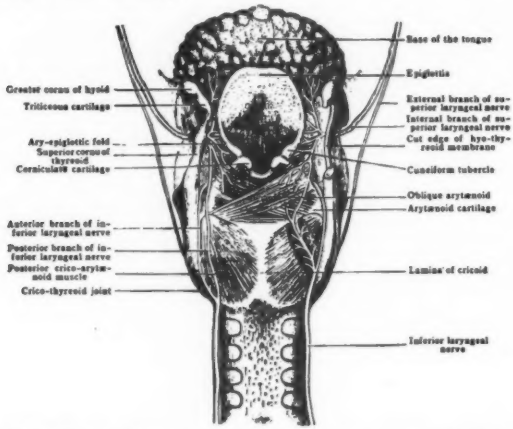

Fig. 436.—Illustrating the communication between the superior and inferior laryngeal nerves and showing how injury to the inferior nerve may cause loss of the epiglottic reflex. (From Morris Anatomy, published by P. Blakiston's Son & Co., Inc.)

The amount of serum that collects in the wound postoperatively has been so reduced by this method of closing the lobes that I have concluded that serous exudate occurs in direct proportion to the amount of bleeding that occurs postoperatively and to the area of unencapsulated glandular tissue that is left exposed.

Amount of Tissue to be Left.—In a general way, the only rule that I follow in regard to the amount of tissue to be left, is that which relates to the severity of the symptoms. The more toxic the goiter, the less tissue should be left. It is seldom one removes too much of an exophthalmic goiter. One fifth to one

eighth of the normal amount of tissue is sufficient in exophthalmic goiter, with a somewhat more liberal allowance in other types. The patients who ultimately have the fewest symptoms are frequently those who have a mild degree of hypothyroidism from six to ten weeks postoperatively.

Mortality.—The mortality in this series of cases has been 1 per cent, one half of which occurred in patients past sixty-five years of age.

CLINIC OF DR. ANDREW STEWART LOBINGIER

GOOD SAMARITAN HOSPITAL, LOS ANGELES, CALIFORNIA

ACUTE OBSTRUCTION OF THE JEJUNUM CAUSED BY A FIBROUS BOLUS

THERE have been but a few cases reported of obstruction of the jejunum from agglutinated masses of cellulose. Some of those reported have been ascribed to eating quantities of persimmons. The case reported here may reasonably be considered one of these.

Case Report.—Mrs. L. R., age thirty-three years, married. Three days previously she had eaten several Japanese persimmons at luncheon. Before dinner of that day she had cramping pain in the abdomen with nausea. The paroxysms of pain would come intermittently and continued through the night. The next day she developed extreme nausea and vomited all she had eaten since noon of the previous day. The pain was over the entire abdomen, more acute to the left and below the umbilical zone. Her bowels had moved each day and following enemas, the day I saw her she had had a very free movement with passage of flatus.

There was nothing of significance in her previous history. She had borne two children—one being four and a half years and the other one and a half years of age. She had never had a serious illness before and had had no operations.

I saw her the second day after the seizure of acute abdominal pain. Her pain was then very acute. After an examination and being unable to definitely locate the cause of her difficulty, she was given a hypodermic of morphia and told if not improved within a reasonable time it would be necessary to have her enter the hospital.

She passed a comfortable evening but in the night her pain again became acute and in the morning she was sent to the Hospital of the Good Samaritan for further study and diagnosis. The morning was spent in *x*-ray examination and laboratory analyses. During this time her pains continued in paroxysms with intervals of moderate relief. All ingesta by the mouth had been withheld and although she was somewhat nauseated, she did not vomit. The blood showed 83 per cent hemoglobin;

Fig. 437.—A flat picture showing a long distended loop of jejunum.

5,152,000 erythrocytes; 13,200 leukocytes; color index, 0.80; polynuclear neutrophils, 85.5.

The urine was normal except positive for acetone and slightly so for diacetic acid.

A flat *x*-ray plate revealed a very long loop of small intestine extending from midway above the umbilicus on the right to the sigmoid on the left and returning back toward the splenic flexure

of the colon. It was frankly small intestine and much distended with gas.

The roentgen report said: "A film of the abdomen, the lower ribs, and pelvis shows evidence suggesting a dilated gas-filled small bowel; there is practically nothing that could be identified as colon. There is a shadow of irregular character on the right side below the lower border of the liver that suggests a calcification. It has no characteristic appearance, however. It is apparently somewhat movable, being seen in two different positions in the two films made."

The clinical picture became increasingly definite, although there was no evidence of shock and the distended intestine clearly showed obstruction. Dr. Rea Smith, who was in consultation, agreed with me that diagnosis was now sufficiently definite to justify operation without further delay. The operation disclosed $3\frac{1}{2}$ or 4 feet of jejunum, very dark and edematous and greatly distended above a firm mass or bolus which had become arrested about midway in the jejunum below the ligament of Treitz. There was some hydroperitoneum but no sign of adhesions or previous inflammatory action within or near the distribution of the small intestinal coils. The appendix was 12 cm. long and filled with dense fecoliths. It was removed.

The mass in the jejunum was removed through a linear incision and this was closed transversely. During this procedure the intestine resumed its natural pink color and approached its normal size, although there was still distinct evidence of edema above the site of obstruction. The other abdominal viscera had been previously examined and no other pathologic condition found.

The patient showed no shock following the operation and left the hospital in two weeks and has made an uneventful convalescence.

The pathologist's report follows: "A large irregular mass of formed fecal matter which measures 4 cm. in length by 3 cm. in diameter. The surface is yellowish green. On being torn apart the mass resembled milk curds with vegetable fibers imbedded. Microscopical examination of the material from the center of

the fecal mass macerated and examined, both fresh and by stained preparation. It consists of amorphous detritus, vegetable fibers, a few fatty acid crystals, and bacteria. Red blood cells and pus cells are absent. The bacteria are relatively fewer than in formed feces.

"Essentially the structure is that of a tangled mass of vegetablefiber encasing fecal particles."

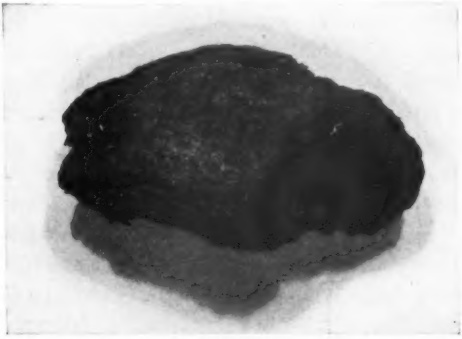

Fig. 438.—Obstructing mass of cellulose from Japanese persimmon in the jejunum.

Obstruction of the jejunum is not a common condition and usually follows inflammatory adhesions due to a previous localized peritonitis, or to perforation of a duodenal ulcer or the gallbladder or to an enterolith. We have had one case of the latter type. This patient recovered after removing the stone. The origin of the calculus was never determined.

CLINIC OF DR. CHARLES D. LOCKWOOD

PASADENA HOSPITAL, PASADENA, CALIFORNIA

PLASTIC SURGERY OF THE EAR

THE introduction of the pedicled tube graft about the time of the World War has greatly widened the scope of plastic surgery. It enables the operator to transfer at will masses of living tissue from distant sites to almost any position he desires. It also enables him to mold the transferred tissue into forms adapted to the needs of the case. It is also possible by means of this type of transplant to carry portions of cartilage, muscle, and small fragments of bone for the purpose of imparting stability to the newly formed structure.

Prior to the introduction of the pedicled graft it was almost impossible to reconstruct the ear. The tissues in the immediate neighborhood of the destroyed or rudimentary ear are too scanty and too flaccid to afford much bulk and stability in the formation of a new ear.

The three desiderata in the plastic reconstruction of the ear are: (1) Plastic tissue in sufficient amount that can be molded into the desired shape or draped over the already existing structures. (2) Tissues of sufficient rigidity to support the softer structure employed in molding the ear, such as cartilages, bones, paraffin, etc. (3) The reproduction and maintenance of the correct angle of the reproduced ear to the head.

It is needless to say that it is not possible to accomplish all of these ends in the most marked cases of ear deformity; at best we can only approximate the intricate design of nature. The prominences and folds which enter into the formation of the ear are so complicated that to approximate them is one of the most difficult feats in surgery. The great vascularity of the ear makes possible, however, a variety of plastic operations upon it. It receives its blood supply from the branches of the superficial temporal, the occipital, and the postauricular arteries.

Defects of the ear demanding surgical intervention are: (1) Congenital and (2) traumatic. In case of total absence of the external ear, it is theoretically possible to transplant an entire ear from one person to another, either directly or by using the back of the hand as an intermediary host for the grafted organ. So far as I know there is no reported case of a complete ear having been transplanted, but there are cases of almost complete severance of the ear from the head where immediate reimplantation has been successful. In order to insure success in transplanting an ear from one individual to another, it would be necessary to have donor and recipient of the same blood group.

When the ear is almost or wholly lacking, plastic reconstruction is at best only partially successful. However, by patience and repeated operations at least a semblance of an ear can be produced and even such an ear is of great cosmetic value, especially in males.

Fig. 439.—Case I. Congenital deformity of the ear. Mastoid operation.

Fig. 440.—Case I. Tube graft prepared from neck. Cartilage implants.

Case I in the accompanying illustrations represents such an ear in process of construction. This patient is a young man twenty-one years of age who was born with a small fragment of ear only, with two crumpled pieces of cartilage and no external auditory meatus. Notwithstanding the complete deafness on

the affected side and almost complete absence of the external ear, he suffered a severe attack of acute mastoiditis, requiring mastoidectomy. This left a deep depression behind the deformed ear and further accentuated his congenital defect. The combined deformity constituted a great handicap. By means of a tube graft taken from the neck and stiffened with pieces of cartilage taken from the eighth rib, the ear has been partially reconstructed. Figs. 439 to 442 illustrate the steps taken in the formation of the ear. The case is still under treatment and will require two or three further minor operations to attain the maximum benefit.

Fig. 441.—Case I. Tube graft transferred to deformed ear.

Fig. 442.—Case I. Graft draped over deformed ear. Ear shifted backward to cover mastoid deformity.

Case II is one which well illustrates the possibilities of the tube graft in restoring a traumatic defect. W. H., age thirty years, was injured on Armistice Day, 1927, in an automobile accident. The upper third of his ear was torn off. He was a healthy, fine-looking man of the better class and the deformity was very disfiguring.

Treatment: The difficult problem presented in this case was to secure sufficient tissue to supply the defect in the ear and to render it rigid.

First operation (November 30, 1927): Parallel incisions were made in the neck 4 cm. apart, extending from the level of the

Fig. 443.—Case II. Upper third of ear torn off by accident.

Fig. 444.—Case II. Tube graft prepared.

Fig. 445.—Case II. Graft transferred to defect in ear. Lower pedicle divided.

deformed ear above for 10 cm. downward. The entire thickness of the skin and fascia were dissected up, leaving the skin at-

tached at either end. Pieces of cartilage of the proper thickness and shape were taken from the tenth rib and embedded in the skin flap. The flap was then folded upon itself and sutured on its under surface, forming a tube.

Second operation (December 19, 1927): The tube graft was divided at its lower extremity, its edges separated, the upper edge of the deformed ear split and the graft was transferred to the ear and accurately sutured with horse hair.

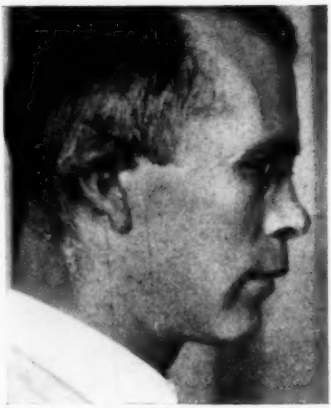

Fig. 446.—Case II. Upper pedicle divided. Graft draped over ear.

Fig. 447.—Case II. Ear completed.

Third operation (January 13, 1928): The graft healed firmly and the blood supply seemed adequate. The transplanted cartilages had remained firmly in place. The upper pedicle of the tube graft was divided, the edges separated, the posterior rim of the lower part of the ear was split and the graft carefully sutured to the split edges of the ear. The defect left by the division of the tube graft was approximated by silkworm-gut stitches. Healing was rapid and there was little sloughing of tissue.

The tube graft restored almost perfectly the contour of the ear and it conformed closely to the sound ear, but is somewhat smaller and a better shape. Indeed, the patient has decided to

have a plastic operation on his sound ear to reduce it to the size and shape of the grafted ear.

The surgical treatment of this case is illustrated by Figs. 443 to 447.

CLINIC OF DRS. A. O. AND RALPH H. LOE

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BRONCHOBILIARY FISTULA

THE most comprehensive report of bronchobiliary fistula to be found in the literature is that of Morton and Phillips[1] in 1928. They were able to collect 49 cases of true bronchohepatic fistula. Since that time Seelig and Singer[2] have reported a case and we are reporting another, bringing the total up to 51.

Case Report.—The patient, Allen G., a boy of twelve years, was admitted to the hospital October 6, 1929. On the previous day he had fallen into a dry well 30 feet deep, the bottom of which was filled with cans, brush, and a variety of débris. The adrenalin stores of the youngster were such that he was able to crawl out unassisted and without knowing that he was injured. He was taken to a neighboring farmhouse and a physician called, who found a penetrating wound of the right upper chest, posteriorly, and also a tunneling wound with its entrance in the right groin and extending upward in the abdominal wall for about eight inches. The wounds were dressed and the patient treated for shock.

He was brought to the hospital the next day and when first seen by us was very restless, quite cyanosed, with rapid shallow respirations, 48, a weak thready pulse, 130, and a temperature of 102 F. Because of the child's desperate condition only a cursory examination was made at that time. The chest anteriorly on the right side showed bronchial breathing, a few scattered râles, and some impairment to percussion. The left side was negative. The abdomen was somewhat tender and there was general moderate rigidity. There was marked tenderness over the liver, though it was uncertain whether there was any actual damage to the abdominal organs. Leukocyte count was 16,100

with 90 per cent polynuclears. Hemoglobin was 85 per cent. The urine was negative.

That night he vomited bile and small clots of blood; later on he had a convulsion. Throughout the night he was in a stuporous condition. Because of the penetrating chest wound in the back and the patient's general condition we concluded that he had a hemothorax, although the physical signs were confusing and were more suggestive of pneumonia.

Fig. 448.—Bedside plate taken two days after accident shows mediastinal structures pushed to the left; diffuse increase in density of right lung. The diaphragm on the right is raised and straight.

The next day, October 7th, his mental condition had cleared, respirations had dropped from 48 to 38, the temperature from 102 to 101 F., and the pulse from 130 to 120. Although he was considerably improved he remained moderately cyanotic, vomited large amounts of bile mixed with a few clots of blood, and was unable to retain fluids. His chest signs remained unchanged except for the appearance of a small area of hyperresonance on

the right side anteriorly; this made us suspect the development of a pneumothorax. A flat bedside radiograph was taken (Fig. 448) which showed the right thorax covered with a dense homogeneous shadow involving the right lung field and pushing the heart to the left. The radiologist was unable to decide whether the lung was consolidated or whether there was fluid in the chest. There was a comminuted fracture of the eighth rib on the right side posteriorly about $1\frac{1}{2}$ inches from the spine.

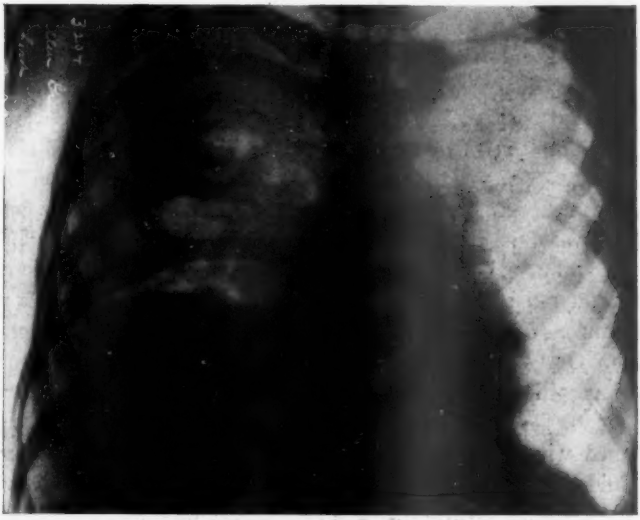

Fig. 449.—Film taken three days after the accident shows irregularity of the right diaphragm which is of interest in view of the later development of a bronchobiliary fistula.

On October 8th the patient's condition was slightly improved and he was able to retain fluids given orally. Pulse was 120, respirations 36, and temperature 102 F.

On October 9th he was quite bright. Temperature was 101 F., pulse 122, respiration 34. He was again *x*-rayed and this time also had a fluoroscopic examination. No fluid level was found and there were no diaphragmatic excursions on the right side. However, the central portion of the right lung was less dense

than on the previous day (Fig. 449). An irregularity in contour of the right diaphragm was also seen in this radiograph. This was suggestive to us of either a ruptured diaphragm, an injured liver or, possibly, a combination of both lesions. The boy was coughing considerably but there was little expectoration; no pneumococci were found on examination of the sputum. Leukocyte count was 16,100 with 90 per cent polynuclears; hemoglobin was 65 per cent. There was still some tenderness over the liver, but the general abdominal tenderness and ridigity had disappeared. The drop in hemoglobin we considered a distinct evidence of internal hemorrhage.

The medical consultant and we, ourselves, now felt quite confident that the boy had a septic hemopneumothorax.

On October 10th continued coughing brought up small clots of blood. Temperature was 101 F., pulse 98, respiration 30. He was nauseated and vomited once. On October 13th his condition was fairly good. He continued to be bothered by his cough and raised considerable frothy sputum with small amounts of bright red blood. Temperature was 99.2 F., pulse 90, and respirations 26. Severe epistaxis made packing of nostrils imperative. On October 17th his condition was practically the same. He was still coughing considerably. A radiograph of his chest (Fig. 450) showed that the right lung field, up to the clavicle, was covered with a dense shadow; this shadow was quite typical of fluid. The heart was pushed to the left (the film was made in the reclining position). The appearance of the left lung was quite normal.

On October 18th coughing increased and became quite troublesome. For the first time the sputum was noted to be yellow and the patient complained greatly of a very bitter taste. On October 19th the coughing continued. Large amounts of bile-stained fluid were expectorated which had a very offensive odor. The cough was racking in nature and very disturbing. As his general condition seemed to be growing worse, it was deemed advisable to drain the pleural cavity through a rib resection. On October 22nd an aspirating needle was inserted into the chest and a small amount of blood and thick pus with-

drawn. During the aspiration the patient coughed up a large amount of bile.

Under local anesthesia 3 inches of the ninth rib, posteriorly, were resected. The chest cavity was found to be partly filled with a mixture of old clotted blood and pus. Because of its thickness it was necessary to scoop out most of this material. A projection was noted about the size of a thumb extending upward from the dome of the diaphragm into the lower portion of the collapsed lung. A needle was inserted into this and free

Fig. 450.—Eleven days after injury. The right lung field is now very dense up to the clavicle. The heart is pushed to the left but not as much as in the previous examinations.

bile aspirated. With a knife a fairly large opening was made into the fistulous tract which connected the collapsed lung and ruptured liver; there followed a profuse flow of bile. A rubber tube was placed into this opening and another into the general chest cavity. Temperature was 102 F., pulse 130, and respirations 32.

For several days the dressings were saturated with bile. Coughing was immediately decreased; subsequent to the operation no bile was expectorated. His cough gradually lessened. The drainage of bile ceased on October 27th, although some pus continued to drain from the chest. His condition was markedly improved.

On October 30th a radiograph (Fig. 451) showed considerable density in the right lung field. This also disclosed the presence

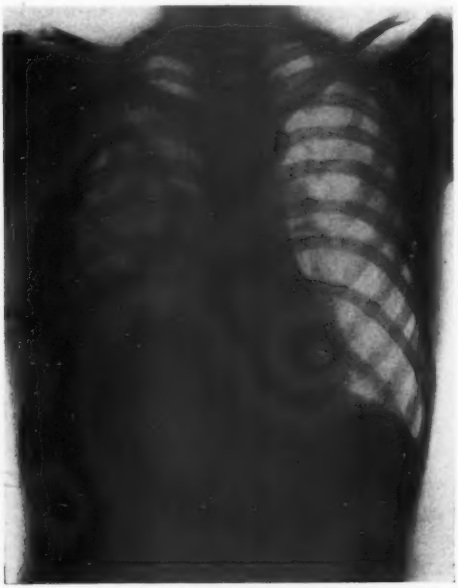

Fig. 451.—Twenty-four days after the accident and eight days after operation. The right chest is clearing. Two rubber tubes are in place. The lower tube which drained the biliary fistula cannot be distinctly seen.

of two drainage tubes and that a portion of the ninth rib had been resected. The base of the right lung was dense and no definite diaphragmatic line could be seen. The left lung appeared normal.

On November 4th dakinization of the chest was begun. By November 12th the drainage tubes had both been removed and

the cough had disappeared. He felt quite well and was walking about. The sinus closed about two weeks after his discharge from the hospital on November 19th.

On November 30th another radiograph of the chest was taken (Fig. 452). The right lung was almost entirely clear, although there was some increased marking of the trunk shadows on the right side; some shading on the right border was indicative of thickened pleura.

Fig. 452.—Picture taken fifty-five days after injury. Patient is symptom free and drainage has ceased. There is still some increase in density about the right hilus.

The patient was last seen March 25th; he had regained his health completely and had no residual symptoms. Fluoroscopy of the chest showed the contour of the right diaphragm to be normal; there was very little decrease in its excursion.

Comment.—In reviewing the sequence of events in this case it is probable that the liver and diaphragm were ruptured at the time of the fall. At least Fig. 449 would indicate that the

diaphragm had been torn. A hemopneumothorax developed, subsequently became infected, and formed adhesions between the torn edge of the diaphragm and the right lung. There thus developed the potential cavity as is described by Morton and Phillips and which they believe is necessary to the development of a bronchobiliary fistula. In the presence of infection, the spasms of coughing were sufficient to rupture a bronchus resulting in the development of a fistula.

This case is one of the few exceptions in which there was no obstruction to the common duct, although it is possible that a blood clot in the upper bile passages may have blocked off a portion of the biliary system. At no time was the patient jaundiced nor did he have clay-colored stools. The condition of primary importance was the hemopneumothorax.

In reviewing records of cases of bronchobiliary fistula—cases without common duct obstruction—it seems quite probable that the fistula would have closed spontaneously. We believe, however, that opening the fistula and draining it externally greatly shortened the period of convalescence and relieved him immediately of a very disturbing cough and the nauseating bitter taste of bile.

In going over the literature there were found three other cases of bronchobiliary fistula resulting wholly from trauma. In 1897 J. E. Graham[3] reported a case resulting from the kick of a horse over the cartilages of the fifth, sixth, and seventh ribs, but without a penetrating chest wound. In this case there was also bile in the thorax. Two rib resections were done, entering evidently separate cavities in the chest as injection of fluid into one cavity failed to come out the other. The fistulous tract was not definitely found, although pure bile was discharged from the lower opening. Fifty-five days after operation a small amount of bile was still draining from the lower opening in the chest and also being coughed up. This, we believe, indicates that the fistulous tract was not directly shunted off.

Tyraman[4] (1909) reported a case resulting from a self-inflicted gunshot wound in the chest. In this instance there was also bile in the pleural cavity. A rib resection was performed and adhe-

sions between the lung and diaphragm were separated. Here also they encountered a strand the size of a finger between the lung and a tent-shaped elevation of diaphragm. No statement is made whether they believed this to be a fistulous tract or not, but it is quite probable that it was. Bile was leaking around the base of the fistula, permitting the bile to enter the chest cavity. The strand was broken with the finger. The following day there was very little expectoration of bile. The patient made an uneventful recovery.

T. R. Elliot and Herbert G. M. Henry[5] report a case of bronchobiliary fistula developing subsequently to a shrapnel wound of the chest and which caused a septic hemopneumothorax. The empyema alone was drained, the fistulous tract was not found and the expectoration of bile did not cease until seventy days after the onset.

Summary.—We have reported a case of bronchobiliary fistula developing in a case of septic hemopneumothorax caused by a fall in which the patient sustained a perforation of the chest wall as well as injury to the diaphragm and liver. At operation the fistulous tract was located and drained, resulting in immediate cessation of bile expectoration. From a review of the literature and our experience in this case we feel that, when a rib resection has to be done because of bronchobiliary fistula in conjunction with empyema or other fluid in the chest, an effort should be made to locate and drain the fistulous tract. Such a procedure immediately relieves the patient of the very disturbing factor of bile expectoration. It also hastens the closure of the fistulous tract. If the fistulous tract is not found and drained it will probably heal spontaneously, but such spontaneous closure is, however, a tedious process and usually of long duration.

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CLINIC OF DR. A. ALDRIDGE MATTHEWS

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THROMBO-ANGIITIS OBLITERANS

THIS first case I am reporting with considerable humiliation, as I reported it in this journal about two years ago as Raynaud's disease, so will give the report as given then, with a subsequent report. At this time the diagnosis was accepted by a neurologist. two internal medical men, and a commission from the State industrial insurance, all of whom examined him.

I did not appreciate that this diagnosis was wrong until I heard a lecture on thrombo-angiitis obliterans at a medical meeting, which made me investigate this case further, and was convinced he had this trouble, this being the first case of the kind to my knowledge I had seen.

Case I.—L. C. White, male, age thirty-five years, American, parents of English descent. Family had past history of no consequence. Moderately heavy smoker.

Present illness began during the winter of 1925; patient freezing the first two toes on his right foot. At this time the toes were black and especially painful at night. Four weeks after the freezing, the tips of these toes were amputated and hot boric dressings applied. Then the toenails were removed. Sloughing continued and in March, 1925 these first two toes were amputated at the base. Wounds healed and pain subsided; the condition steadily improved and the patient left the hospital the middle of April, 1925, and was discharged July 1st, as cured.

One year later, August, 1926, the patient crushed the tip of his index finger on the left hand; the skin not being broken. Soon the finger became blackened and began to pain. Lanced one week later, the wound continued to drain and refused to heal.

Finally I amputated the tip half way down the nail. The wound continued to slough and pain as before, and in January, 1926,

Fig. 453.—Case I. L. C., showing hands healed, also trophic changes in nails. This photograph taken two years ago. Condition same today.

the finger was amputated at the first or distal phalangeal articulation, healing in reasonable time.

Fig. 454.—Case I. L. C. Feet as they appeared two years ago. Right foot healed. Sloughing wound base of left great toe.

In May, 1927 the patient let an iron bar fall on two fingers of both hands, contusing them considerably and breaking the skin on one finger; they became black and painful. The second

finger on the left hand was later amputated at the distal phalangeal articulation. This wound did not heal and continued to slough, so amputation was done at the middle joint. It continued to slough, but finally healed months later. The index finger on the right hand began to slough and finally on February 8, 1928, was amputated at its base. All these wounds healed and the patient suffered no pain subsequently.

Fig. 455.—Case I. L. C. As patient is today. Wounds healed, no evidence of further involvement.

In November, 1927 the nail on the third toe, right foot, fell off and sloughing began, with much pain. At this time the big toe on the left foot became infected following an ingrowing toenail. It also sloughed and drained continually, and finally it was necessary to amputate both toes at their base. This was done on February 15, 1928. Since that time the wounds have continued to slough and drain, with considerable pain associated, especially at night. Seemingly there was no improvement, in spite of many local applications, etc., large amounts of Ringer's solution internally, and a femoral arterial sympathectomy on both thighs. However, the sympathectomies did

give relief for about six days, and the wounds seemed to show some evidence of healing.

Condition improved and patient was discharged from the hospital. Several months later condition became very annoying again, at this time had claudication in both legs, more so in the left; gangrene began in the stump of great left toe with a gradual melting away of the tissue on dorsum of foot. The

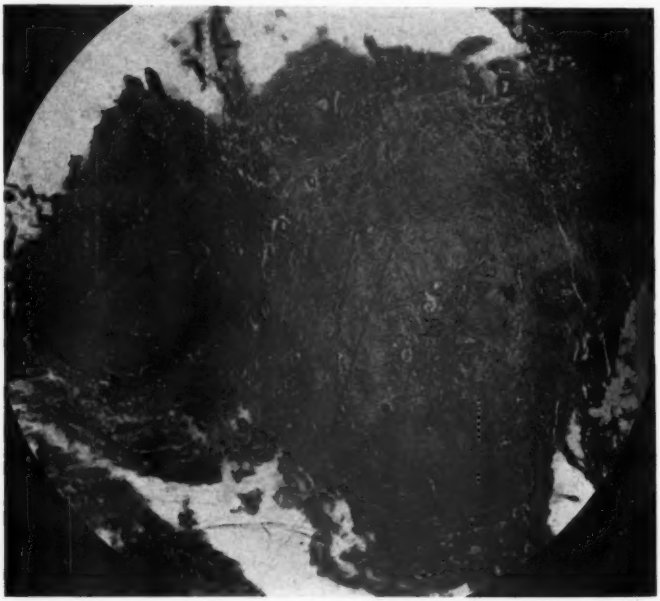

Fig. 456.—Case I. L. C. Sections No. 10116 low-power photomicrograph. *A*, Narrowed and thick-walled vein. *B*, Obliterated artery with recanalization. Mild infiltration within muscular coat.

dorsalis pedis, posterior tibial, and the popliteal arteries could not be felt to pulsate. There was a marked redness of the foot, especially when in pendent position, and blanching out when leg was elevated. An amputation was advised just above the knee, but patient insisted it be made below the knee, which I did on November 5, 1928. There was very little bleeding and only

three vessels were tied, although the muscles seemed to have a good color. The wound did not heal and the skin over the tibia began to slough. On December 4, 1928 a Gritti-Stokes amputation was done, wound healing primarily. He left hospital and was comfortably getting about with crutches until about January 1, 1930, when he began to have pain in his right foot. There was no pulsation in the arteries of this foot and I could not detect pulsation in the popliteal artery. Rest, elevation, and heat were advised along with transfusions of 3 per cent salt solution, which were given twice a week, 300 cc. each time he complained about pain becoming more severe after salt injection. For this I can give no explanation, but they were continued. The pain he claimed was most intense at night. The second week of March, 1930 a small necrotic area developed on stump of amputated great toe, and a distinct redness half way up the ankle on dorsal surface, which disappears when foot is elevated, becoming ischemic, similar to condition which occurred in the left foot. In using the oscillometer on this extremity, I can get no oscillations below the knee and very slight at the knee, as this is one of the ways of determining where the amputation should be done; and as no pulsation could be felt in the popliteal vessels, I advised amputation just above the knee. But the patient refused to have it done here and insisted that I do it below so he could get a knee action. Amputation was done on middle and upper third of leg March 17, 1930. Only one vessel bled sufficiently to require a ligature. Stump was dressed on the third day and there was evidence of necrosis of the anterior flap, and on the fourth day this was much more marked, undergoing gangrene, so did Gritti-Stokes amputation March 22, 1930. This patient is now thirty-eight years old. The wound is healing primarily, there has been no drainage, this being ten days since the last amputation (Fig. 455).

Pathologic Report.—Gross.—Specimen 56047 consists of an amputated leg, measuring 12 inches in length. The amputation has taken place through the middle third of the foreleg. The first and second toes have been amputated. This amputation has taken place at the phalangeal-metacarpal joints. The skin

over the remaining toes is somewhat discolored but otherwise the skin covering the remaining portion of the leg is normal. Upon section the subcutaneous tissues appear somewhat edematous, but otherwise unchanged. The larger vessels are of markedly thickened walls and the lumen of some appears completely obliterated.

Microscopical.—Sections of the artery show a complete obliteration of the lumen by a hyalinized connective tissue that contains many newly formed blood vessels. These contain normal red cells and leukocytes. The coat representing the intima is often replaced by a broad zone of hyalinized connective tissue in which there are many accumulations of lymphocytes and newly formed blood vessels. The central zone of the muscular coat shows a dense infiltration by lymphocytes and in it there are some newly formed blood vessels. The peripheral zone is entirely free of blood vessels but shows some replacement by connective tissue. The fatty and fibrous tissue surrounding these vessels contain some contracted and engorged blood vessels, but otherwise is unchanged. The veins show a considerable degree of thickening of their wall but the lumina, however, are still patent and contain red cells and leukocytes. No inflammatory reaction, however, is noted within any of the vein walls.

Diagnosis.—Chronic mesarteritis. Thrombo-angiitis obliterans with recanalization.

Case II.—A. E. A., Fig. 457, married male, age forty-eight years, occupation clerk. Family and past history of no consequence; parents Swedish, but born in this country. Persistent smoker in past twenty years, smoking from twenty to thirty cigarettes a day.

In 1921 began to have trouble with his left foot. A sore developed between his outer two toes; previous to this had cramps in the calf of his leg, which was very annyoing as at that time he was on the police force and walked much of the time. He laid off for two months and the sore healed. Shortly after going back to work the sore reopened; had severe pain in the foot which was more or less constant and at times almost unbearable.

The ulcer spread to the dorsum of the foot, which he claimed had been very red most of the time. Then a gangrenous patch developed on the dorsum of foot, and an amputation was done about 6 inches below the knee. This being done elsewhere, I have been unable to get any data as to the pathologic findings.

There was no further trouble until March, 1929 when soreness developed on inner side of right foot, under big toe. There were no cramps, but a burning sensation of the distal half of

Fig. 457.—Case II. A. E. A. As he is now. Getting around comfortably with crutches and an artificial limb.

foot and a redness on the top of foot which was especially noticeable when limb was pendent and caused considerable discomfort, especially if he got about on it. There was no pulsation in the dorsalis pedis or the posterior tibial artery, but pulsation could be felt in the popliteal artery.

He saw Dr. John T. Bird of this city in September, 1929, who made a diagnosis of thrombo-angiitis obliterans, and had

been under his care until I amputated the leg at the middle lower third on December 4, 1929.

During the time Dr. Bird had him under his care he used principally elevation, rest, heat, and many injections of 5 per cent sodium chloride solution. Patient claimed he suffered in-

Fig. 458.—Case II. A. E. A. Section No. 9828 low-power photomicrograph. *A*, Organized and recanalizing thrombus within artery. *B*, Intense infiltration within muscular coat. *C* and *C'*, Smooth muscle fibers. *D*, New-formed blood vessels.

tensely before amputation. Wound healed primarily and since he has been perfectly comfortable in regards pain (Figs. 458 and 459).

Pathologic Report.—Gross.—Specimen 54825 consists of an amputated right leg, amputation having been made through the

middle third of the leg. The skin covering the leg and foot are practically unaltered. However, all toes are of a dark purplish color and the line of demarkation is quite sharply defined. A considerable amount of foul-smelling slough covers the distal portion of the toes and dorsal portion of the foot. In the deeper portion muscles and connective tissue in the dependent portion

Fig. 459.—Case II. A. E. A. Section No. 9828 high-power photomicrograph showing intense cellular infiltration within muscular coat at point indicated in Fig. 458. Also evidence of new vessel formation.

are markedly edematous, elsewhere they appear unaltered. The larger vessels in the leg are considerably narrowed and the wall shows thickening. However, they still contain some fluid blood.

Microscopical.—Sections of the vessels above described show many of the veins and arteries considerably narrowed, some entirely so by a hyalinized connective tissue. In some the outer muscular coats are separated by a connective tissue in which there are many engorged and congested blood vessels, and throughout this coat there are accumulations of lymphocytes, some plasma cells, and eosinophils. The tissue separating the

vessels contain many contracted and engorged blood vessels. All vessels are not equally as diffusely infiltrated by lymphocytes but varying degrees of infiltration and activity are noted. An occasional vein is noted, as well as artery showing obliteration.

Diagnosis.—Chronic mesarteritis. Buerger's disease.

Case III.—H. R. R., January 25, 1930, married male, age forty-one years, occupation merchant. Family history of no consequence except several members of family died of cancer. Past history of no consequence. Used tobacco very moderately some years go, but not of late years.

About eight years ago had an infection in left leg, which developed following an exertion (playing baseball); the leg became swollen to the knee and ever since that has worn an elastic stocking. If he does not the leg will swell. About seven years ago began to have pain in his left foot, sometimes in the calf when he exerted himself or worked hard, being on his feet. At this time, seven years ago, was annoyed for several weeks, gradually the discomfort went away, but was noticeable at times if he was on his feet much, and this only occasionally.

One year ago after running for a train, he had a numbness develop in his left big toe, and pain in the calf of his leg, the discomfort especially noticeable when he walked, and was so severe that it was with difficulty he got around for the following six weeks, the discomfort gradually disappearing.

At the present time he was lifting a weight which he had to carry up a flight of steps, had a severe pain in the calf of the left leg which annoyed him for four or five days when he walked. Shortly following, the left foot became numb and he thinks this developed in the night when he was asleep, and has remained so. Occasionally there is a tingling sensation and this is especially in the great left toe. There is no disturbance in his opposite foot or leg. About the first part of December developed a herpes zoster which started at knee on left leg and extended half way to ankle. This condition is now about healed.

Blood pressure 130/90. Wassermann negative. Physical examination negative with exception of left leg and foot. No

pulsation could be elicited in vessels of foot nor the popliteal space, apparently normal in groin.

There is a marked erythromelia when foot is pendent and an ischemia when elevated. Oscillometer shows no oscillations until just above the knee.

Has had eight intravenous injections of 5 per cent salt solution, but there was in each case an obliteration of the superficial vein so the procedure has been stopped.

This patient will be kept under observation and continued rest will be carried out as far as possible. He feels there is some improvement in the past two months. I rather think so myself, as there certainly has been no definite progression in the case since I first saw him.

I will demonstrate the oscillometer on this case by first placing it on the unaffected leg, where you can see the oscillations are normal, but upon placing it on the affected leg, you see there is no oscillation until I put it over the popliteal space, and here we get just the slightest indication of an oscillation. This conclusively shows that the arteries up to this point are thrombosed. I am hoping this will be one of the fortunate cases in this disease which will become permanently arrested and will go on and develop sufficient collateral circulation to carry on.

I wish to thank Dr. Robert E. Stier, pathologist at St. Luke's Hospital, for his pathologic reports and illustrations.

I wish to go over thrombo-angiitis obliterans in a general but superficial way with you. Due credit should be given to Leo Buerger for his splendid work on the subject and by whose name this disease so often, and rightly, goes, and I take the liberty of quoting from his work on the subject a number of times. It is recognized today as a definite, pathologic entity, but is sometimes spoken of as presenile, infantile, or juvenile gangrene, and arteritis obliterans. Von Winiwarter gave it the name of endarteritis obliterans in 1879, by which title it went until Buerger in 1908 described it and gave it the title of thrombo-angiitis obliterans, which is accepted today by all the English-speaking countries.

The average age of its occurrence is thirty-two, the youngest

case reported was seventeen, and the oldest at fifty-six years. It is an inflammatory disease involving the deep arteries and veins, usually of the lower extremities, but may involve the upper. The condition has been noted in the spermatic and renal vessels. The inflammatory condition involves the artery and vein, as a rule, equally, but in 20 to 25 per cent of the cases there is a migratory thrombophlebitis and this process often invades the superficial veins and when such does occur, if one of these veins be removed and examined histologically, a definite diagnosis can be made.

It has been generally thought that this disease was limited to Semitic origin, but this has long since been disproved as you see by these cases, as these men are English, Swedish, and Scotch-English descent, although all born in this country. Buerger collected 500 cases, in which there were seven Gentiles, and in another series of 300 there were nineteen Gentiles. This disease rarely affects women, in a series of 1000 cases only 3 of them were females.

There is nothing definitely settled as to the etiology, but we do know it is an inflammatory process, even though the specific organism has not been isolated. Tobacco has often been regarded as a causative factor more than any one other thing, but this is not essential as there are cases reported in individuals who have never used it in any form. In these 3 cases, two are heavy smokers and the third has used it in moderation and of late years not at all. It is well known that tobacco does have a decided effect upon some individuals, blood vessels, therefore it should in these cases be avoided. Typhus, endocrine dyscrasias, exposure, and cold all have been regarded as factors, but it is questionable if they have any bearing other than possibly aggravating the existing condition.

This disease is usually continuous, but not always, and may be arrested at any stage and go on to recovery with or without treatment.

The vessels when we see them are filled with a grayish-yellow mass, resembling wax, the reason for this is that the disease is far advanced in the terminal stage. This thrombus terminates

often abruptly and extends into the healthy vessel in a rounded-like mass, in the earlier stage more conicle, as shown in Fig. 460.

This inflammatory process invades the whole thickness of the vessel walls and often the surrounding tissue and in longstanding cases the fibrous tissue is so dense that it is impossible to separate the artery, vein, and nerve without tearing them.

In examining the thrombus one can see small openings (canalized), in its ends from which small particles of blood might be squeezed. These openings may vary in number and size.

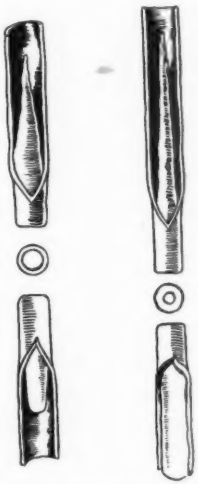

Fig. 460.—Thrombi terminating in apparently intact vessels. Upper figures, conical type of clot, there being an accretion or stagnation red clot over the old obturating organized clot. Lower figures, rounded extremity of older type of clot ending in healthy portions of vessels. (Buerger.)

This inflammatory process progresses in a chronological order.

1. Acute inflammatory lesion with thrombosis.
2. Formation of miliary great cells foci.
3. Organization and canalization of clot.
4. Disappearance of inflammatory process.
5. Development of fibrous tissue binding together artery, vein, and nerve.

"It may correctly be said that patients afflicted with thromboangiitis obliterans do not usually suffer directly from the disease itself, but from the disastrous occlusive thrombosis which signalizes nature's method of healing a vascular lesion that has long since disappeared."

The first symptom these patients complain of is pain in the foot, usually the left, or elsewhere in the leg, aggravated upon exertion (intermittent claudication). This condition may go on for weeks or months and later develop trophic disturbances. There is a cyanosis of toes and fore part of foot which, when the foot is pendent, a bright redness develops (rubor or erythromelia). If the leg is elevated the redness disappears and a deathlike palor replaces it (blanching or ischemia). There is a lack of pulsation in the arteries of the foot. One should practice and educate himself to find the dorsalis pedis and posterior tibia artery for in some they are difficult to find in the normal; the popliteal and femoral should also be examined.

At this stage of the disease these patients suffer intensely with a pain which will require sedatives. The constancy of the pain makes it almost unbearable and they will do anything for relief, even beg you to remove the diseased member. Then comes the terminal condition, gangrene, which is often precipitated by some slight injury or infection around the nail.

It has been estimated that from the definite onset of a gradually progressive case, it takes about twenty months for the development of gangrene, and it is further estimated that 75 to 80 per cent of these cases eventually come to amputation.

There has been a very valuable instrument developed by Pachon, known as the oscillometer, which I have demonstrated to you gentlemen. It is also a valuable instrument to use in determining where to amputate, for with it we can indicate where the pulsation starts in the artery, and this is a fair indication of where to do the amputation.

There is no specific treatment, but it is suggested in the early cases that rest is very important and should be persisted in for weeks. The following treatments are recommended: The use of sodium chloride in 3 to 5 per cent solution given intravenously

at three-day intervals, using from 300 to 400 cc. The application of heat, being especially careful not to burn on account of lowered resistance of the tissue. The posteral treatment, which is a hard thing to have your patient do and very few will carry it out. Time will not permit me to go into this with you. Flushing the large bowel every day with large quantities of Ringer's solution; also have the patient drink quantities of the same.

Removal of the lumbar sympathetic ganglion affecting the extremity of that side.

Posterior root section and the use of insulin all may be tried, and amputation as a last resort if condition goes on to gangrene.

CLINIC OF DR. CHARLES E. PHILLIPS

HOLLYWOOD HOSPITAL, LOS ANGELES, CALIFORNIA

ABSCESS OF THE LUNG

THE surgical treatment of lung suppurations presents one of the most interesting as well as the most progressive fields in the domain of surgery.

The day of "empyema necessitatis" is passing. Patients are being relieved surgically of localized lung suppurations which were hopeless two decades ago.

Lung surgery is a two-edged sword. It cuts one way to open an abscess or just as easily it cuts the other way to destroy the patient.

The unskilled operator opens the abdomen and removes a diseased appendix with an unnecessary mortality of 20 per cent. He removes a goiter with an unnecessary mortality of 50 per cent, but when he opens a lung it is almost a miracle if the patient survives.

The requirements for a competent lung surgeon may be briefly enumerated:

First: Ability to recognize pathology by physical examination.

Second: Ability to interpret *x*-rays of the chest.

Third: An adept with local and regional anesthesia who possesses technical ability to perform the most difficult surgical work.

The following case illustrates some of the problems of chest surgery:

Miss C. M., age twenty-five years, referred by Dr. J. J. Kocher, was admitted September 13, 1927. Her complaint was that of daily paroxysms of cough producing large amounts of mucopus and of progressive asthenia. This began in 1917 with an attack of the flu, followed by cough and a pleurisy in the

right lower chest. At that time she was confined to bed for six weeks. The expectoration was large in amount, mucopurulent, sometimes tinged with blood, and without odor. Occasionally it became lessened in amount when temperature, malaise, and rapid loss of strength occurred. These attacks were terminated by paroxysms of cough and profuse expectoration.

Her family and personal histories showed nothing of note, except that she had suffered from spinal curvature since she was thirteen years of age. In spite of this deformity she was able to lead a very active life until the onset of her present trouble.

Fig. 461.—Condition of chest on first examination, showing the marked scoliosis and density beginning at the level of the ninth rib.

Physical examination revealed the following pertinent conditions: Height 5 feet, 3 inches. Weight 83 pounds. Blood pressure 90/75. Marked lateral scoliosis and lumbar lordosis. Marked prominence right chest posteriorly. Percussion showed tympany over the right lower lobe. There were no breath sounds in this area. *x*-Ray of the chest (Fig. 461) showed a limited involvement of the lower lobe of the right lung.

Laboratory findings: Red blood cells, 3,649,000; leukocytes, 8600; neutrophils, 84 per cent.

Dr. Simon Jesberg made a bronchoscopical examination of the affected portion of this lung. This was very difficult on account of the tortuosity of the trachea. He succeeded in passing the bronchoscope down the posterior division of the right bronchus then the cannula was passed beyond and finally entered a cavity. After withdrawing about 2 ounces of mucopurulent material an injection of lipiodol was done and a stereo picture

Fig. 462.—Bronchoscope and cannula passed into the lung abscess, with the abscess partially filled with lipiodol.

was taken (Fig. 462). This shows the deformity of the chest structures, the bronchoscope and lipiodol in place. The bronchoscope was withdrawn, the patient sat up, and a second radiograph was taken (Fig. 463). On account of her weakened condition no attempt was made to *x*-ray her in the inverted position.

After the *x*-ray examination was made she was returned to bed and allowed to rest for three days before any operative work was attempted.

On September 17th she was returned to the surgery and a field-block anesthetic of the right lower dorsal region was given, injecting the roots of the ninth, tenth, and eleventh nerves as they emerged from the intervertebral foramen. An incision was made over the tenth rib and about $2\frac{1}{2}$ inches of this was resected. The pleura was found to be adherent and was opened with a cautery knife. The incision was continued through a small amount of lung tissue until the abscess cavity was reached. The

Fig. 463.—Bronchoscope withdrawn and the patient in an upright position showing the lipiodol at the dependent part of the cavity.

contents, consisting of a quantity of mucopus and lipiodol, was aspirated. A rather large opening was made—sufficient to allow free access and exploration of the cavity. This opening was filled with several large, soft rubber drainage tubes and also several Dakin tubes were inserted. The patient experienced no discomfort during the operative procedure and left the table in good condition. After a few hours, Dakin solution was instilled every three hours during the day and once during the night. The administration was started very carefully because of the knowl-

edge of an open bronchus leading into the abscess cavity. No difficulty was encountered and the patient made speedy progress. The temperature became normal after six days. The cough and expectoration ceased. She was able to return home ten days after operation. The tubes were gradually extruded by contraction of the cavity and by elevation of the diaphragm on that side (Fig. 464). Complete healing occurred within two

Fig. 464.—Obliteration of the cavity by the expanse of the lung and elevation of the diaphragm. Healing was complete.

months. A few moist râles could be heard over this area for about three months and then even these signs disappeared. She has gained greatly in strength and weight and has been able to lead an active normal life.

This case illustrates: (1) The importance of skilful bronchoscopy in making an accurate diagnosis in lung suppuration. (2) The advantages of a regional anesthetic which lessens the chances of disseminating the infection. And, finally, (3) the advisability of treating lung suppuration on the principles of adequate drainage and the proper use of Dakin solution.

CLINIC OF DR. FREDERICK LEET REICHERT

FROM THE DEPARTMENT OF SURGERY, STANFORD UNIVERSITY MEDICAL SCHOOL

EPILEPSY DUE TO AN ARTERIOVENOUS ANEURYSM OF THE BRAIN

I WISH to present Mrs. S., age forty-two years, American housewife, who was admitted to the medical service with the complaint of nocturnal convulsions during the last seven years.

The patient can give no history of convulsions during infancy or childhood. She has enjoyed excellent health until shortly before the present illness when two fainting spells occurred without apparent cause. She is of a quiet temperament and has only become anxious about her health in the last few months.

Seven years ago, at the age of thirty-five years, the first nocturnal convulsion occurred. The patient's cry awakened the husband who saw her suddenly go into a generalized clonic convulsive state lasting two to fifteen minutes and followed by a deep sleep. Involuntary urination and a bitten tongue made the patient realize on awakening in the morning that some unusual situation had arisen during her sleep. For two years the seizures were infrequent, appearing at intervals of four or five months, then the frequency increased and in the past few years they have occurred about every two months. The attacks were unrelated to menstruation, emotional strains, or physical efforts.

Several years ago after reading of a popular diet the patient limited herself for two days to a diet consisting exclusively of fruit juices. Three convulsions occurred in the two succeeding nights. During the past two years on awakening after a convulsion she has often noticed severe pain in the right temporal region which would be relieved by vomiting. Three months before

admission to the hospital the seizures began to appear at monthly intervals with premonitory restlessness for a day or two before the attack.

There is no complaint other than this nocturnal epilepsy characterized by onset in middle life. No account of localized convulsions could be elicited from the husband who always described a generalized clonic state associated with bed-wetting.

On direct questioning the patient thought that the left side of her body felt more tired than the right on some mornings after an attack.

The physical and neurological examinations reveal nothing of importance. The visual fields are normal. Ophthalmoscopical findings show normal eyegrounds and normal pulsation of the retinal vessels. Percussion and auscultation of the skull reveal no abnormalities.

Of the special examinations the blood pressure was found to vary from 128/106 systolic with 80/70 diastolic. The blood count, urine analysis, and blood Wassermann were negative. On lumbar puncture the cerebrospinal fluid was found to be slightly increased in pressure although no manometric readings were taken. There were ten white cells in the fluid which gave negative Nonne, Noguchi, Wassermann, and colloidal gold reactions.

I felt that the story of epilepsy starting in middle life and always occurring at night strongly suggested an intracranial vascular lesion, such as an angioma, or a venous or arteriovenous abnormality. In the absence of attacks observable during hospitalization, I recommended ventriculograms as the first means of localization, knowing that the onset of epilepsy in adult life is generally due to a tumor or space occupying lesion.

Roentgenographic study of the skull showed a calcified pineal gland displaced about 1 cm. toward the left side in the anterior-posterior view. The petrous portion of the temporal bone on the right side was evidently somewhat decalcified. Some faint small calcifications seen in the right temporal fossa probably in the peripheral portion of the temporal lobe were strongly suggestive of tumor.

While the patient was being studied on the neuro-psychiatric service by those interested in epilepsy, an attempt was made at encephalography by introducing air into the spinal subarachnoid space, but this was not successful.

The patient was then transferred to our service for ventriculography. Roentgenograms showed by the pineal shift a space-

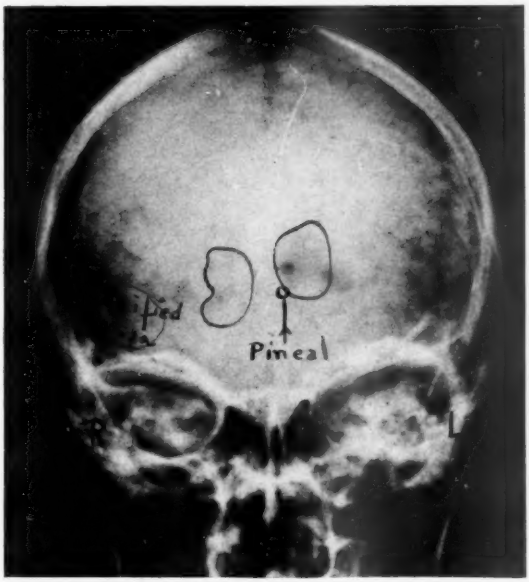

Fig. 465.—Retouched ventriculogram, anterior-posterior view showing the lateral defect in the horn of the right ventricle. The shift of the pineal to the left is indicated. Many small calcifications were seen stereoscopically in the outlined area.

occupying lesion in the right cerebrum, but air injection was indicated to outline the ventricular boundaries and to definitely localize the lesion in its relation to the right ventricle.

The ventriculograms showed a normal left lateral ventricle. The body and temporal horn of the right lateral ventricle were obliterated, and a lateral irregularity of the anterior part of this ventricle was clearly seen in the anterior-posterior view (Fig.

465). The calcified area in the right temporal lobe seemed to be in the ergion of the island of Reil.

The exact location of a space-occupying lesion was now definite. A gliomatous tumor would, of course, be the most probable diagnosis. However, the long history of a single symptom, epilepsy, manifesting itself only during sleep, in a patient without objective signs of increased intracranial pressure, led me to

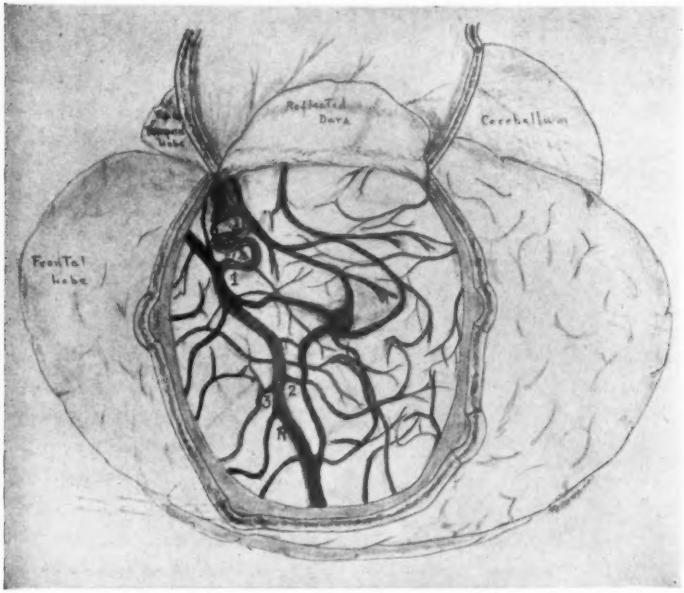

Fig. 466.—Drawing made at operation of an arteriovenous aneurysm of the brain. The direct end-to-end communication between a sylvian artery and rolandic vein is indicated at 1. At 1, 2, and 3 pulsating red arterial blood entered the rolandic channel (*R*). The partially calcified portion of the lesion in the region of the island of Reil is not indicated.

believe that a vascular abnormality was in this case the cause of the epilepsy.

Under local anesthesia an exploration was made by a right craniotomy so placed as to expose the right parietal and temporal lobes. Manipulation of the dura and palpation of the cortex

was much more painful than normally. As indicated in the illustration (Fig. 466) the convolutions were of normal size and firm in consistency. In the sylvian fissure the subarachnoid spaces were enlarged and quite deep, forming a large lake of cerebrospinal fluid out of which four serpentine arteries arose from the tip of the temporal lobe. The superficial and more tortuous artery in the fissure contained red pulsating blood, but in its continuation over the parietal lobe it became bluish in color. Its course and situation was that of the rolandic vein and it was found to enter the longitudinal sinus, yet it originated as an artery in the sylvian fissure. Close inspection of this vessel revealed its true nature. As it emerged from the sylvian fissure a vein coming from the frontal lobe emptied pure venous blood into this channel at the junction of the sylvian and rolandic portions (1 in Fig. 466). The confluence of the dark and bright-red blood streams was easily seen through the lumen, making the lower half of the rolandic channel a reddish purple. When the arterial supply (*S* in Fig. 466) of this channel was shut off by pressure with the handle of a scalpel below the entrance of the venous branch, it became bluish and pulseless. On occluding the venous branch the lower half of the rolandic channel became filled with red pulsating blood. At a midway point in the rolandic channel two arteries (2 and 3, Fig. 466) sent their red arterial blood into the rather purplish stream. On occluding them the upper portion of the rolandic channel took on the color of a vein, and presented, when the primary arterial source in the sylvian fissure was also occluded, throughout the true appearance of a normal rolandic vein (*R* in Fig. 466). This rolandic channel measured 4 mm. in diameter, about the size of a normal rolandic vein. No thrill could be felt with the gloved finger.

The ventriculograms had shown that the main mass of the arteriovenous aneurysm lay beneath the motor area in the region of the island of Reil. An attempt was made to expose the middle cerebral artery and explore the under surface of the temporal and parietal lobes for the location of the main part of the lesion, but the tortuous arteries in the sylvian fissure were found to be so adherent to the inner surface of the dura that

their mobilization was considered too dangerous. The alternative of a subcortical exposure and resection would have led to a hemiplegia. Ligation of the serpentine sylvian artery at its junction with the rolandic channel might also have resulted in motor and sensory impairment.

In the hope that a branch of the middle meningeal artery might connect with the sylvian fissure vessels, this artery was ligated just distal to its emergence from the foramen spinosum, with, however, no visible effect on the lesion.

Knowing that the space-occupying vascular lesion had displaced the pineal gland and obliterated a portion of the right lateral ventricle, this region was decompressed by incising the dura and rongeuring away the bone beneath the temporal muscle over an area 8 or 9 cm. in diameter.

The patient's convalescence was uneventful and she was up in a chair on the sixth postoperative day.

Comment.—Eight months have elapsed since the craniotomy and decompression without a return of convulsions. Decompressions frequently afford definite amelioration of symptoms to patients with similar lesions.

The very close proximity of the subcortical angiomatous portion, as well as the cortical fistulous portion of the lesion to the motor area and the resultant danger of a hemiplegia, precluded a complete excision which would, of course, have promised a most satisfactory cure.

Ligation of the internal carotid artery in the neck was not attempted because of the absence of enlargement of this vessel and of a bruit or thrill in the lesion. In some cases it has led to amelioration of signs and symptoms, but even this cannot be permanent because of the collateral supply through the circle of Willis.

Radiotherapy applied to angiomas in various parts of the body has frequently produced an inactive state of the lesion by thrombosis. Such treatment has led to temporary amelioration of symptoms in a few intracranial arteriovenous lesions, but in a patient of Cushing's with roentgenographic evidence of calcification before radiotherapy no increase in the calcified

areas appeared after four series of deep *x*-ray treatments. Calcification in the lesion, such as my patient showed, might be considered as an indication that the lesion is dying and becoming inactive.

INTRACRANIAL ARTERIOVENOUS ANEURYSMS IN GENERAL. THE REPORT OF DANDY

In 1928 Dandy[1] reported 8 cases of arteriovenous aneurysms of the brain and was able to collect 22 additional cases from the literature. These were all congenital in origin and could be grouped into three types: First, those in which an "anomalous vessel of congenital origin establishes a direct end-to-end communication between an artery and vein"; second, those in which the aneurysm is formed by "a communication between a large artery and a contiguous vein by one or more aberrant vessels"; and third, those in which "a network of vessels—so-called angioma—is interposed between an artery and one or several veins."

Time of Appearance and Duration of Symptoms.—Intracranial arteriovenous aneurysms are not uncommon, occurring in about 1 per cent of all tumors of the brain. They may be found in almost any part of the brain, most frequently in the paracentral region. Of 18 cases in which data as to the onset of symptoms was available, Dandy reports that: "The first symptoms appeared in seven patients between the ages of one and ten years; in three patients between thirty-one and forty years; in five patients between forty-one and fifty years; there was no record of first symptoms for patients between twenty-one and thirty years of age.

"In 44 per cent of the patients, therefore, the first symptoms did not appear until after the age of thirty, and in 30 per cent symptoms began after the fortieth year. The latest time of appearance was at the age of forty-eight.

"The duration of symptoms ranged from a few hours to fifty years. In 4 of 18 cases symptoms had been present for more than twenty years."

Gross Appearance.—Usually the aneurysms are character-

ized by the large tortuous cortical veins through the walls of which the pulsating red, arterial blood can be seen mixing with the dark venous blood, this admixture being an essential point in the diagnosis.

Symptoms.—Dandy found that the symptoms were fairly characteristic. "Jacksonian convulsions followed by transient loss of sensation or motor power in the part affected by the convulsion, and a gradually progressive sensory or motor hemiplegia on the affected side, are the symptoms common to most of the aneurysms affecting the cerebral hemisphere. The symptoms are usually of many years, duration, often beginning in childhood and continuing into adult life; again, they frequently do not begin until after the thirtieth or fortieth year."

Cerebral Hemorrhage.—Of the 22 cases collected from the literature 41 per cent died of cerebral hemorrhage and Dandy feels that when a cerebral hemorrhage occurs before the time when vascular accidents are to be expected, it is the result of a tumor or aneurysm, either of which may contribute defective vessels.

The Report of Cushing and Bailey.—Cushing and Bailey,[2] in a monograph on blood-vessel tumors of the brain, contribute 6 more proved cases of arteriovenous aneurysms which they term "angioma arteriole," although they suggest the title "angioma arteriole et venosum" as being more exact. Three other cases were suggestive of aneurysm, but they were not proved by exploration.

The age of onset of symptoms was from thirteen to thirty years (thirteen, eighteen, nineteen, twenty-two, twenty-four, thirty) and the duration of symptoms ranged from two to forty-six years (two, three, seven, eight, ten, forty-six).

Two of the 9 cases reported had nonpulsating unilateral exophthalmos.

In 5 of their 6 proved cases the lesion was located in the cerebral hemispheres; 3 suffered from convulsions, and in 4 an intracranial bruit was detected. The bruit was a complaint in the 3 unproved cases.

Bruit.—Although intracranial bruit is strongly suggestive of aneurysm, certain vascular intracranial tumors may have an

audible bruit. Cushing states that one or two examples of this are among his series of meningiomas. Because of a loud bruit heard in a child of five, where skull plates showed areas of calcification in the right frontal region, I made the diagnosis of arteriovenous aneurysm. At operation a large, partially cystic glioma of very embryonic type of cell (neuro-epithelioma according to the classification of gliomas by Cushing and Bailey) was exposed. The bruit disappeared as soon as the dura was incised.

Treatment.—Although radical ligations and extirpations are curative they are generally dangerous to life and function and are indicated only in the small group of cases where the aneurysm is posterior to the motor tracts. Palliative measures are available in selected cases, such as ligation of the internal carotid artery for cerebral aneurysm and of the vertebral artery for cerebellar aneurysm, and decompressions in cases in which pressure symptoms have appeared. Cushing reports some amelioration of symptoms from deep *x*-ray therapy.

Epilepsy and Space-occupying Lesions.—The great frequency of epileptiform attacks occurring in patients with cerebral angiomas, venous abnormalities, and arteriovenous aneurysms is apparently due to the fact that vascular anomalies are more likely to occur in the middle cerebral artery and so involve the paracentral convolutions.

Epilepsy is a symptom. The causative factors are various and frequently are never identified, yet in the cases under discussion it is evidently provoked by these vascular abnormalities.

Most cases of so-called idiopathic epilepsy show definite organic changes in the cortical or subcortical regions, indicating a pathologic process of an infectious or toxic nature at some period of life, either intrauterine or later. Epilepsy may also be a distressing aftermath of traumatic head injuries, the attacks being focal or generalized in character. Epilepsy is often the first symptom of brain tumors and of intracranial vascular anomalies, such as angiomas and arteriovenous aneurysms. Certainly epileptic attacks appearing for the first time in a patient past puberty strongly suggests a tumor or vascular abnormality of the brain. Nocturnal epilepsy points to a vascular anomaly.

Many measures are being tried to control epileptic seizures. Of the more recent ones, the maintenance of a fairly constant degree of acidosis by the ketogenic diet with a moderate dehydration by limiting fluids and the use of drugs of the bromide group have found favor—yet all these measures treat only the symptom, and are not aimed at the underlying causative agent.

The important point about the patients with epilepsy, as emphasized by Dandy, is to differentiate those cases in whom curative measures can be applied to the causative agent, whether the lesion be a localized scar, a tumor, or a vascular anomaly.

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CLINIC OF DR. A. J. SCHOLL

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THREE CASES OF CARCINOMA OF THE KIDNEY, ATYPICAL IN TYPE

THE following cases of alveolar carcinoma of the kidney are of interest because of unusual evolution which, with misleading clinical tests, contributed to increase the difficulty of accurate diagnosis. The first case, preoperatively and postoperatively during recurrence, showed pyrexia which, though not rare, is unusual and complicates diagnosis. The second case illustrates the operative difficulties that may be expereicned in an old-standing nephropexy case. The third case shows that an unusually large malignant tumor of the kidney may be present with but few subjective symptoms of importance.

Case I.—Carcinoma of right kidney with high fever during the primary and recurring stages; invasion of kidney pedicle; death.

History.—A man aged forty-six years came complaining of fever and pain in his back and legs. During the last two years he had gradually lost 60 pounds; he had been dieting to reduce his weight. Frequently during the last two years and constantly the last six weeks he had had night sweats. For ten months he had an occasional evening fever, and for several months he had had attacks of pain in the suprapubic area. There was occasional nocturia, but no dysuria or hematuria. For two months prior to the first examination he had a very high fever not only in the afternoon and evenings, but, at times, even in the morning. The temperature varied from 98 to 104 F. For ten days it remained above 101 F. During this time the pain in his back

and legs, which had not been severe, became excruciating, requiring large amounts of morphine for relief.

Physical Examination.—The right kidney, which was readily palpated, was markedly tender; neither the left kidney nor the liver edge could be felt. An examination of the heart and lungs did not reveal anything unusual.

Laborotory Data.—The urine was cloudy, with a specific gravity of 1020. It contained a large amount of albumin, blood, and pus, but no sugar. The two-hour intravenous phthalein re-

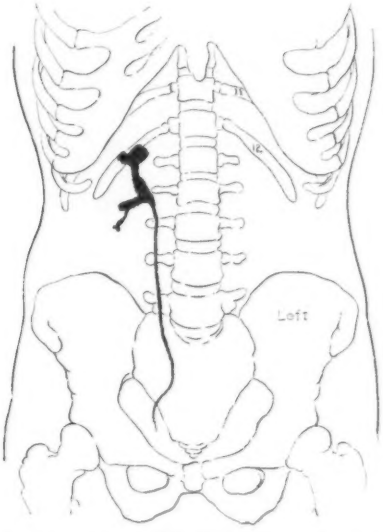


Fig. 467.—Case I. Elongated, poorly filled pelvis with partial obliteration of middle calyx.

turn was 35 per cent. Hemoglobin, 75 per cent (this dropped to 60 per cent in three weeks); red blood cell count, 4,360,000; and leukocyte count, 8500. Roentgenograms of the chest, pelvis, kidneys, ureters, and bladder revealed nothing abnormal.

A slightly inflamed bladder was found on cystoscopy. No urine was seen spurting from the ureteral orifices during a period of five minutes. The ureters were catheterized; no urine was

obtained from the right kidney and only a small amount from the left, containing a few pus cells. A divided phthalein test returned 4 per cent from the left kidney in fifteen minutes. Nothing was obtained from the right side. A right pyelogram showed a large and elongated pelvis (Fig. 467). Only a small amount of opaque substance could be injected into the kidney pelvis. The calices were large and blunted and were outlined only by a few fine lines.

Clinical Diagnosis.—1. Acute infection of the kidney. 2. Kidney tumor.

Operation.—Gas anesthesia. A right, posterolateral incision was made. The kidney was edematous and three times normal size. It was dark, hemorrhagic, and on its convex border covered with a bulbous patch which, in color, looked like the adrenal gland; this spread out over an area 10 cm. in diameter. A specimen removed from this region was reported malignant after examination of a frozen section. Three clamps were then placed on the vascular pedicle and the kidney, together with its capsule and surrounding tissues, removed. The renal pedicle was thick and friable, so one of the clamps was not removed. Two ligatures were also placed on the pedicle. The wound was closed in the usual way. The clamp was removed in seventy-two hours and the patient readily recovered from the operation.

The kidney was 12 cm. long, with a spherical, nodular tumor 9 by 7 by 7 cm., occupying the middle portion. On cut surface the tumor was grayish with yellowish necrotic areas; it was poorly defined, small nodules occurring in the kidney tissue beyond the main mass. There was no capsule about the growth. Two large branches of the renal vein were filled with soft tumor growth.

Microscopical section showed an indefinite alveolar arrangement with large, extremely atypical epithelial cells, having a granular cytoplasm (Figs. 468, 469) Many of the nuclei were large and polymorphous. Some of the cells appeared like multinuclear giant cells. In places the cytoplasm of the cells was clear.

Pathologic Diagnosis.—Alveolar carcinoma of the kidney.

The wound healed readily and the patient left the hospital in two weeks. Three weeks after operation his temperature, which had been normal directly after operation, went up to

Fig. 468.—Case I. Large atypical epithelial cells forming an alveolar arrangement. (× 120).

Fig. 469.—Case I. Alveolar structure resembling arrangement of normal renal tubules (× 50).

102 and 104 F.; the severe pain he had had before operation in his legs and back also returned. One month after operation a

nodule of tumor growth appeared at the upper angle of his wound; this rapidly spread until it involved the upper third of his incision. He died two months after operation. During his last six weeks the temperature remained almost constantly elevated and his severe pains required large doses of morphine for even partial relief.

Comment.—This case illustrates how prominently fever may figure as a symptom either of the original renal tumor or as an indication of recurrence or metastases. The fever in this case, which was manifest before removing the kidney and which returned with the recurrent growth, was very severe; with the signs of toxic poisoning, it at first suggested that we were dealing with an infectious process.

Very little has been written concerning fever as a symptom of malignant tumors. Creevy recently reported 2 cases of renal tumor and made a review of the cases in the literature in which fever was an outstanding symptom. Israel was the first to call attention to this condition; fever was present in 18 per cent of his cases of hypernephroma. In several cases it was the only symptom noted by the patient. Israel believed that the pyrexia was due to the formation in the tumor of specific pyrogenic substances. Judd and Hand, in 367 cases of carcinomas of the kidney seen at The Mayo Clinic, state that chills and fever and night-sweats were present in about 10 per cent of cases.

Regarding the operative finding of extension of tumor growth into the renal vein, this is not an uncommon occurrence with renal tumor; but, while it markedly increases the operative risk, it does not necessarily indicate a bad prognosis. Foulds, in a review of 200 cases of tumor of the renal parenchyma treated at The Mayo Clinic, found that the renal vein was involved in 45 (22.5 per cent). Nine of the forty-five patients died directly after operation. In the remaining 155 cases, in which the renal vein was not involved, there was a hospital mortality of 1.5 per cent, only two patients dying. Of the thirty-six patients with involvement of the renal vein who survived the operation, complete postoperative data were obtainable concerning thirty-one. Twenty-two of these died in less than two years after operation.

Five of the forty-five (11.1 per cent) patients are alive from three to fourteen years after operation.

Extension to the renal vein greatly increases the difficulty of accurate hemostasis and the risk of secondary hemorrhage; the vein is rigid and friable, having lost its usual elasticity, and, after ligation or clamping of the pedicle, the contained plug of tissue prevents accurate healing of the incised veins. The renal vein has not uncommonly been opened, a plug of renal tumor removed and the vein successfully closed during the course of nephrectomy for malignant disease. In some cases the tumor growth may be so extensive as to pass through the renal veins and the vena cava to the right auricle of the heart.

Case II.—Carcinoma of right kidney following a nephropexy twenty years previously. Operative difficulties in such cases.

A woman aged forty-eight years came for treatment of intermittent hematuria. She had always been quite well except for a pain in the right renal area of several months' duration which had been relieved by a right nephropexy performed twenty years ago. She had passed the menopause four years ago.

History.—One year ago she had an attack of hematuria. Specimens of urine for a period of two weeks contained much blood and, at times, clots. There has been two similar, though shorter, attacks occurring ten and seven months before, respectively. The last attack started two weeks prior to examination, during which time her urine contained much blood and occasionally large clots. For the last eight months there had been a dull nonradiating, fairly constant pain in the right side of her abdomen, which was never very severe or colicky, but very annoying. At times she had short, sharp pains in the right lower abdomen, usually relieved after she passed blood clots. There had been no nocturia, dysuria, or frequency of micturition.

Physical Examination.—Nothing abnormal was found except that the right kidney was palpable. It was firmly fixed, smooth, and not tender on palpation. There was a short, straight, well-healed scar in the right costovertebral area.

Laboratory Data.—The urine was hazy and acid, and had a specific gravity of 1020. It contained no sugar, but there was a trace of albumin, a moderate amount of pus, and many bacteria. The two-hour intravenous phthalein return was 60 per cent. A roentgenogram revealed the shadow of a large right kidney.

Cystoscopy showed a normal bladder and urethra, with both ureteral orifices spurting clear urine, the left more so than the

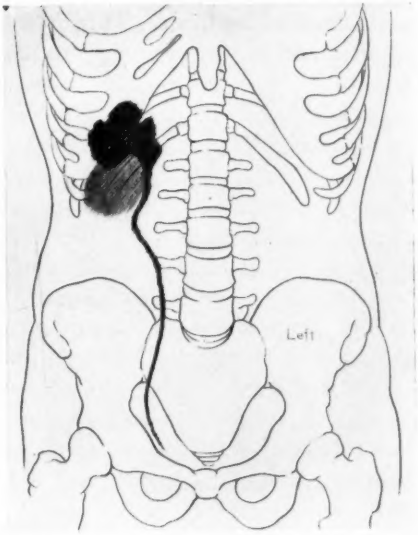


Fig. 470.—Case II. Large, dilated, irregular pelvis with obliteration of calices. Rounded shadow of soft tissue tumor at lower pole.

right. Both ureters were readily catheterized. The specimen from the right kidney contained a few red blood cells and an occasional pus cell; that from the left was normal. Intravenously injected phthalein returned in five minutes from each side; 8 per cent was obtained from the right kindey and 12 per cent from the left in fifteen minutes. Twenty-five cc. of fluid were withdrawn from the right renal pelvis. A pyelogram of the right kidney showed a large, irregular, dilated, and distorted pelvis

with an almost complete obliteration of the renal calices (Fig. 470).

Clinical Diagnosis.—1. Pyonephrosis. 2. Kidney tumor.

Operation.—A right posterolateral incision was made under gas anesthesia, cutting through the scar of previous operation. There was marked perirenal bleeding with very extensive adhesions around the old scar. It was impossible to deliver the kidney in the usual way, so the capsule was cut through and the kidney reached subcapsularly. The segment exposed was smaller than a normal kidney, distorted, and firm. There was free bleeding from the renal mass and it was impossible to identify all the structures. The turned-down renal capsule was cut away in a circular manner which permitted clamping the vascular pedicle directly instead of through the thickened doubled capsule. The pedicle was triply ligated and cut. The ureter was tied and cut 4 cm. below the kidney. Investigation of the removed renal mass showed that the pelvis, which had appeared dilated in the pyelogram, did not form part of it, and on examining the renal area it was found impossible to locate the pelvis or any remaining kidney tissue there. The wound was closed in the usual manner and the patient sent from the operating room in good condition.

Section of the removed renal mass revealed a tumor 7 by 6 by 5 cm., well encapsulated by an irregular fibrous condensation capsule; it was hemorrhagic and nodular and made up the bulk of the mass removed. There were several small nodules containing yellowish fatty areas and many heavy fibrous bands which divided the tumor into different segments. Only a small area of renal tissue was attached to the tumor.

Microscopical sections revealed a cellular structure in which were groups of large clear cells in an alveolar arrangement. These cells were filled with a lipoid material. Very few mitotic figures were seen (Fig. 471).

Pathologic Diagnosis.—Carcinoma of the kidney.

The patient readily recovered from the operation, but drained urine from her incision after the second day. She was given a course of *x*-ray treatments with the idea of destroying any remaining tumor fragments and possibly of causing an atrophy of

the remaining renal fragment. The wound drained urine continuously for three months without decreasing in amount.

At a second operation the old incision was opened and the upper portion of the kidney containing the pelvis was now found firmly adherent to the muscular wall opposite the lower two ribs. There was only slight bleeding and the few remaining vessels were clamped, ligated, and cut. The wound was closed in the usual manner and the patient made an uneventful convalescence; healing was rapid, and two years later she was in normal health and had had no further trouble.

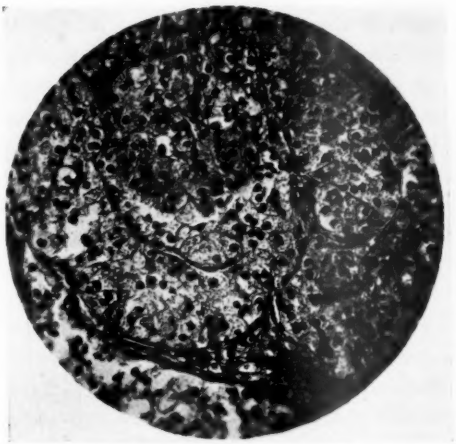


Fig. 471.—Case II. Alveolar arrangement of cells. Granular cytoplasm and large nuclei (× 100).

Comment.—The kidney, after long-standing nephropexy, usually becomes markedly adherent to the chest wall. In most cases sharp dissection is necessary in order to free it from its bed. In this case the capsule was readily separated from the lower portion of the kidney and its contained tumor, but, when the portion of kidney that was adherent to the chest wall was reached, it was impossible to strip off the capsule and a false line of cleavage was opened. It was not noticed that the pelvis was not attached until the vascular pedicle was ligated and cut and the lower renal

segment removed. A further attempt to remove the remainder of the kidney at that time jeopardized the safety of the ligated vessels and was not done. It was not known how large a segment of kidney remained; if only the pelvis remained it would probably not cause trouble.

The original roentgenogram revealed the shadow of a large kidney; this was due to the perirenal adhesions and thickening of the surrounding tissue, a not uncommon finding following surgical procedures on the kidney.

It is almost impossible to remove a kidney after a long-standing nephropexy except by the subcapsular method. In this case a procedure, first described by Fedoroff and later by W. J. Mayo, was employed. The kidney was pulled outward, which put tension on the vascular pedicle; the turned-back renal capsule was then cut around the pedicle and the vessels were brought through the circular opening. This permits safe, certain clamping of the vascular pedicle without the intervention of the thick capsule. In the usual procedure of subcapsular nephrectomy the pedicle and the thickened edematous capsule are clamped "en masse." It is very difficult to safely ligate such a thick friable segment of tissue.

Case III.—Large carcinoma of the kidney, without local extension, producing very few symptoms.

History.—A man aged fifty-one years was referred for treatment of an abdominal tumor. Twenty years ago he had extensive pulmonary tuberculosis and was in a sanitarium for seven years. For the last eight years he has been exceptionally well. He had been moderately constipated for six months; it was necessary for him to take a cathartic daily. Two years ago he had one week of dysuria and frequent micturition. There had been no hematuria or nocturia nor any signs of urinary trouble since that time. In 1927 he weighed 172 pounds; he now weighs 160 pounds. Two weeks ago, while rubbing his abdomen, he felt a large mass on the right side. He had had no pain.

Physical Examination.—The patient was a well-developed man with a rather sallow complexion. A rounded mass was

visible below the right costal margin. There was no abdominal tenderness nor rigidity. The mass, which was between the costal margin and the crest of the ilium, was about 20 by 15 cm. in size, smooth, firm, and tense, but not fixed. It could readily be moved about 3 cm. toward the midline.

Laboratory Data.—The urine was acid with a specific gravity of 1020. There was neither sugar nor albumin and only a few red blood cells present. The two-hour intravenous phthalein return was 50 per cent. Hemoglobin content of the blood was 65 per cent; red blood count, 4,500,000; and white cell count, 6600. Blood Wassermann test was negative. A roentgenogram of the abdomen revealed a large, soft tissue tumor occupying the upper right abdominal quadrant. The medial border of the tumor extended over the lateral margin of the vertebral column; the lower border extended to the level of the iliac crest. The tumor was extrinsic to the gastro-intestinal tract, displacing the hepatic flexure of the colon downward and to the left.

Cystoscopy revealed a normal bladder with clear urine spurting from both ureteral orifices. Both ureters were catheterized and an occasional cell found in the urine from each kidney. A divided function showed that the right kidney was doing only one fourth of the work of a normal kidney; the function of the left kidney was greater than normal. A right pyelogram showed the same large tissue tumor seen in the original roentgenogram. There was a displacement and flattening of the pelvis and calices and a torsion of the pyelographic shadow which was turned upside down and flattened out over the top of the tumor shadow. Apparently the weight of the tumor mass had pulled the renal pelvis downward and out of place. The ureteral shadow was displaced toward the median line (Fig. 472).

Clinical Diagnosis.—1. Kidney tumor. 2. Kidney cyst.

Operation.—Gas anesthesia. A right posterolateral incision was made, the abdominal limb of the incision extending almost to the umbilicus. The muscles were thin and the renal mass, which could readily be felt, bulged into the wound. The mass was exceedingly large, hard, slightly irregular, and covered with dilated blood vessels. The superficial blood vessels, some of

which were as large as the renal vein, were ligated and cut. The renal mass was then freed enough so that the renal pedicle could be clamped, thus preventing the spread of malignant tissue. The entire kidney was well encapsulated and free from any adhesions or extension of the growth through the capsule. The renal pedicle was then triply tied and cut, and the renal mass removed. There was moderate hemorrhage during the operation, but after removing the kidney the wound was comparatively dry. One

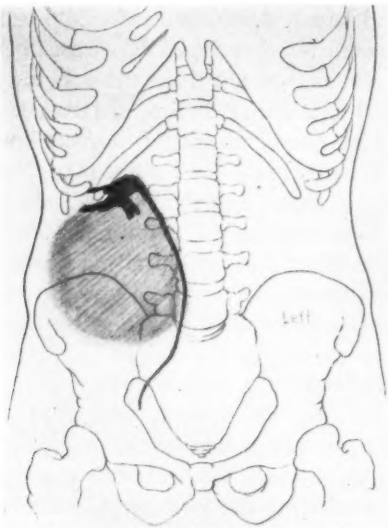


Fig. 472.—Case III. Shadow of large soft tissue tumor, superimposed by distorted and displaced pelvis.

yard of 2-inch iodoform gauze was placed in the cavity to fill the area and to help control any possible hemorrhage and the wound closed. The patient's general condition at the end of the operation was very good.

The specimen showed a large, well-circumscribed spherical tumor 12 cm. in diameter, protruding from the convexity of the right kidney. The tumor displaced about two-thirds of the kidney substance and extended into the renal pelvis (Fig. 473).

The renal vein was not invaded. The cut surface showed a soft, flabby, translucent, vascular tumor containing a few yellow areas of necrosis. Microscopical sections revealed in general an alveolar arrangement with a delicate connective tissue framework. The alveoli were mostly filled with clear atypical epithelial cells containing large nuclei. In areas the alveolar spaces contained hyaline and colloid material. There were very few mitoses.

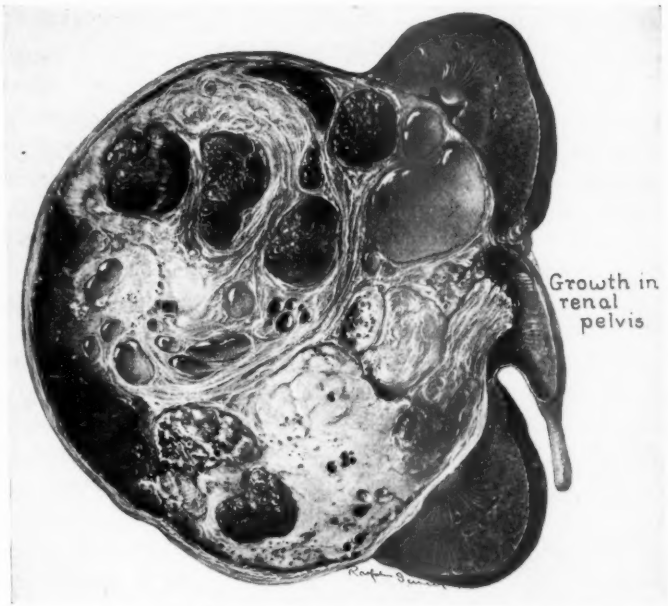


Fig. 473.—Case III. Circumscribed spherical tumor with destruction of most of renal tissue.

Pathologic Diagnosis.—Carcinoma of the kidney.

The patient made a good operative recovery and was given a course of therapeutical *x*-rays over the operated area. One year after operation he was still in good general health with no signs of recurrence.

Comment.—This case is of interest due to the extreme size of the tumor and to the lack of marked symptoms. The growth

was entirely encapsulated, there being no evidence of any further extension of the tumor. Pain is almost invariably present in malignant tumors of this size; and hematuria is usually observed, especially when the tumor extends into the renal pelvis.

The patient's constiptation was completely relieved following the removal of the tumor and was probably caused by pressure on or kinking of the colon.

General Remarks.—The tumors in these 3 cases were of the same type of malignancy, alveolar carcinoma, which make up only a small proportion of renal tumors. In a seris of 184 cases of renal carcinoma reported by Foulds, Braasch, and Scholl from The Mayo Clinic only 32 (17.38 per cent) were alveolar carcinomas. The remaining 152 cases were of the papillary adenocarcinoma type, usually considered as the hypernephroma group. Alveolar carcinomas are highly malignant, invading the pelvis early and breaking through the renal capsule. The postoperative and later mortality in the cases of alveolar carcinoma reported from The Mayo Clinic was very high, only 3 (13.4 per cent) of 23 patients who could be traced were still living.

Histologically these tumors tend to reproduce the tubules of the adult kidney, resembling the renal parenchyma. The structure varies from that of the well-formed alveoli to areas in which there is very little differentiation, the cells being matted together with only a small amount of intervening stroma.

CLINIC OF DR. CHARLES T. STURGEON

GOOD SAMARITAN HOSPITAL, LOS ANGELES, CALIFORNIA

HOUR-GLASS STOMACH DUE TO AN ULCER OF THE LESSER CURVATURE. REPORT OF A CASE

MRS. D. C. A., female, aged fifty-eight years.

Chief Complaints.—(1) Pain in the epigastrium; (2) vomiting; (3) inability to take solid food.

At the age of sixteen years patient was treated for several months for indigestion, manifesting itself as pains after meals and vomiting. She does not remember how soon after meals the pain occurred. After several months' treatment the symptoms disappeared, and she felt perfectly well for three years; able to eat any kind of food. At the age of nineteen patient had another attack of stomach trouble which was ushered in by vomiting about two cupfuls of bright blood. For the next four months she had severe pains immediately after eating, and this lasted for several hours; was relieved if she vomited. A diagnosis of gastric ulcer was made at this time which was treated by diet for about five months, with entire relief.

For the next twenty-four years patient enjoyed fair health with only an occasional mild attack of pain and vomiting which was immediately corrected by diet. At the age of forty-three she had another severe attack of pain in the epigastrium and vomiting. The pain grew worse a few minutes after taking food; vomited some bright blood. At this time an *x*-ray examination of the gastro-intestinal tract was ordered and a diagnosis of hour-glass stomach made. Patient again recovered from this attack and enjoyed short intervals of fair health, but had several attacks of pain and vomiting.

The present attack started one year ago, being similar to previous attacks. The patient had reached the stage where she

could only take fluids, and not more than 2 or 3 ounces at one time; if she took more it caused severe pains and vomiting. She has been confined to bed for the last six months because of weakness and loss of weight. She has lost 50 pounds during the last four years.

No other illnesses or operations.

Examination.—Patient is a very sick and emaciated female of fifty-eight years, weighs 80 pounds.

Physical examination is entirely negative except for emaciation.

Blood Pressure.—138/68.

Urine.—Acid; specific gravity, 1020; trace of albumin; few hyaline and granular casts.

Blood.—Hemoglobin, 71 per cent; erythrocytes, 3,616,000; color index, 0.76; leukocytes, 8200; polynuclears, 68 per cent; lymphocytes, 28 per cent; transitionals, 2. Bleeding time, two minutes, forty-five seconds. Howell's method. Coagulation time, four minutes, slide method. Group IV.

Blood Chemistry.—Nonproteid nitrogen, 40 mg. per 100 cc. of blood; sugar, 80 mg. per 100 cc. of blood; chlorides, 385 mg. per 100 cc. of blood.

Roentgenological examination of the gastro-intestinal tract showed a marked hour-glass stomach; this was retaken after physiologic doses of atropine was administered, and the deformity still persisted (Fig. 474).

This patient was given intravenously 100 Gm. of glucose in 1000 cc. of normal saline the day previous to operation.

Operation (August 28, 1929).—The stomach was divided into two segments by an hour-glass constriction. Both segments were about of equal size (15 cm. for the anterior and 17 cm. for the posterior). On the lesser curvature was a calloused ulcer 2 cm. in diameter. The whole contracted area was very hard.

The gallbladder was normal.

The operation consisted of a sleeve resection, removing about 6 cm. of stomach. The cut ends of the stomach were approximated, using two rows of No. 1 gastro-intestinal sutures.

Pathologic Report.—*Tissue from Stomach.*—Specimen is a piece of stomach wall about 6 cm. in diameter. In the center is a deep ulcer about 1 cm. across, with steep edges. The blood vessels in the wall of the stomach opposite the ulcer appear sclerotic.

Microscopical examination of the wall and base of the ulcer shows no evidence of malignancy.

Diagnosis.—*Chronic peptic ulcer.*

Postoperative Care.—A Levin duodenal tube was inserted through the nose into the stomach and the stomach continually

Fig. 474.—Showing hour-glass construction of stomach.

aspirated for eight days, after which time fluids passed through the stomach normally. This patient was given daily 75 Gm. of glucose in 1000 cc. of salt solution intravenously, also 1000 cc. of salt solution subcutaneously for ten days.

Blood Count (September 2, 1929).—Hemoglobin, 59 per cent; erythrocytes, 3,232,000; color index, 0.76. Condition of patient not very good, pulse weak. Five hundred cc. of whole blood was transfused. Condition gradually improved. On the

eighth day fluids passed through the stomach; a few days later she was taking soft food, and from then on improvement was continuous and satisfactory.

Patient left the hospital September 21, 1929, twenty-five days after operation. She has continued to improve, and at present, March 15, 1930, she is able to take regular meals. She is careful of her food, but is not on any diet. Has gained 23 pounds.

Roentgenological Examination (March 14, 1930).—The administration of an opaque meal shows the stomach to be somewhat deformed, probably as the result of the resection which was performed. The stomach filled readily, but after a few moments developed a spastic incisure on both curvatures which was evidently the result of spasm of the circular fibers. The stomach emptied rapidly. The pylorus and duodenal bulb were normal.

On the whole the stomach seems to be functioning in a very good manner and the incisure which is present is wholly spastic in origin (Fig. 475).

Hour-glass stomach occurs frequently enough to be considered in analyzing certain gastric symptoms. The stomach may be constricted in the upper middle or lower portion with a consequent varying in the size of the loculi.

The constriction may be caused by an ulcer, benign or malignant growths, by inflammatory bands attached to the liver, pancreas or abdominal wall, the result of perforating gastric ulcers.

With ulceration there may be extensive inflammatory thickening and solid induration. In general the symptoms are those of obstruction varying according to the age of the patient and location of the constriction. When the condition is caused by ulcer there is considerable variation in the severity of the symptoms dependent on the degree of obstruction in relation to the degree of acidity which is commonly moderate, but occasionally high or low. In some the suffering is not great and but little attention is paid to the trouble until late, when partial obstruction is the essential symptom.

The benign condition usually develops slowly. Pain is more commonly associated with active ulcerations and complications of perforations.

This patient had symptoms for forty-two years.

In the hands of an expert roentgenologist the diagnosis can easily be made.

The treatment is purely surgical, and the type of operation to be performed will depend entirely upon the condition of the

Fig. 475.

patient, the adhesions present, and whether the condition is benign or malignant. A great many different kinds of operative procedures have been tried, as is well illustrated in the report of T. T. Thomas (British Journal of Surgery, vol. ix). The following procedures were used in 50 cases:

1. Gastroplasty (7).
2. Gastrogastrostomy (15).
3. Posterior gastro-enterostomy in proximal power (14).
4. Double postgastro-enterostomy (2).
5. Retrocolic anterior gastro-enterostomy (3).

6. Anterior gastro-enterostomy (3).
7. Gastroduodenostomy in proximal loop (1).
8. Retrocolic anterior gastro-enterostomy in proximal and postgastro-enterostomy distal (1).
9. Partial gastrectomy (2).

The treatment, I think, can be summarized as follows:

In the greatly debilitated patient a double post gastro-enterostomy is the operation of choice. This will relieve the obstruction, but unfortunately, it does not remove the ulcer, which should be removed if possible. If the patient's condition is not too serious a sleeve resection is the operation of choice, as it removes the ulcer-bearing area, and the function of the stomach following this procedure is usually very good. If malignancy is suspected a gastrectomy should be done, removing the lower pouch and the malignant area. The operation can then be completed by a post or anterior Polya.

CLINIC OF DR. GEORGE W. SWIFT

SWEDISH HOSPITAL, SEATTLE, WASHINGTON

TUMORS OF BRAIN

Case I.—Mrs. J. L. H., fifty-four years of age, mother of six children, was first seen at our clinic April 23, 1929, referred by Dr. Gerhardt of Wenatchee, Washington.

History.—On or about August 15, 1927, at three o'clock in the morning, she had her first convulsive seizure. The spell began with cramps in the right leg, followed by unconsciousness. This unconscious spell did not last long and during the next day she vomited rather freely. The following few days she felt that she had had an ordinary bilious attack. Three months later she had a similar attack, and this time she consulted a physician, who thought that it was probably a convulsion due to gastro-intestinal disturbance and prescribed eliminative treatment. In December, 1927 she consulted another physician and at that time a diagnosis of a probable tumor of the brain was made. In view of the fact that she had a two-plus Wassermann, however, intravenous medication was instituted. She returned home and was treated by her local physician. The seizures began to increase in frequency and severity during the latter part of 1928. In October she had two, in November two, and December two. At the time of our examination she was having seizures approximately every ten days. They were interesting inasmuch as they began always with a drawing-up of the right foot, then an inversion and a drawing up of the right leg, after which she went into a general convulsion.

At the time of our examination, April 23, 1929, she complained of more or less headache, associated particularly with the spells, with a feeling of impending danger, as though something in her head was about to burst. She had a puffiness and

tenderness on the scalp of the right side of her head (Pott's tumor of the scalp). Aside from a general weakness, she did not have any particular symptoms. Her past history did not shed any light upon her condition. Four years ago she had her tonsils removed and three years ago had her teeth out, both to relieve biliousness. She has had more or less biliousness all her life, so she did not feel any anxiety at the time of these operations.

Examination of this patient revealed a woman well preserved for her age. Eyes: Normal muscular activities; there was no evidence of change in the caliber of the vessels or of edema of the disks.

She had no cranial nerve involvement. There was a weakness of the right hand and a marked weakness of the right leg, almost an ankylosis of the right ankle with inversion of the foot, with slight foot drop. Examination of the reflexes showed the abdominal reflexes to be absent on both sides, but her abdomen was rather soft and flabby and the reflexes were hard to elicit. Sensory examination: There was a numbness of the right side of the body but no disturbance for vibration or for position.

The patient walked with a rather characteristic gait, dragging the right foot and having a tendency to walk to the right. While she had a little difficulty in speech and perhaps a little in memory, it was not a marked symptom, nor did she have nausea or vomiting to any marked degree, no more so than the above-described "bilious" attacks. She had had no severe headache.

All of the positive neurological findings were confined to the right side of the body, a weakness of the right arm and leg, almost an ankylosis of the right ankle with foot drop, the foot turned inward; the reflexes on the right side were markedly increased over the left; a positive Babinski on the right, and a marked ataxia of the right foot.

She was sent to the Swedish Hospital, where on April 24th a cerebroventricular study was performed. A lumbar puncture was made in the fourth interspace. Pressure in the upright position was 30 mm., 30 cc. of fluid were removed, and 30 cc. of air injected in 3 cc. amounts.

Serology: Cell count 5; Nonne negative; Wassermann negative; colloidal benzoin 44444444221.

Interpretation of *x*-Rays: Anterior posterior view (Fig. 476) shows the ventricular shadow to be narrow in its vertical dimensions. The left is displaced to the right, almost to the median line, is triangular in shape, flattened on the superior side. In the lateral view (Fig. 477) a narrow shadow, extending obliquely

Fig. 476.—Mrs. J. L. H. Anterior-posterior encephalogram showing a flattening of the left ventricle from above downward.

from the sella upward and backward is seen; also another narrow curved region of the usual upper posterior portion of the lateral ventricle, and still another of a more triangular form superior and slightly inferior to the sella. Since these shadows are unusual as compared to the normal ventricle, the findings point definitely to a lesion in the left part of the skull.

Diagnosis was made of tumor, endothelioma, left sagittal region.

The first operation on this patient was done April 27, 1929. The patient was prepared in the usual manner for an exploratory craniotomy. The outline of the incision was made in the shape of a horseshoe, with flap backward over the vertex. After the draperies were applied, the incision was made through the scalp and periosteum. Bleeding was controlled with Andrew skin

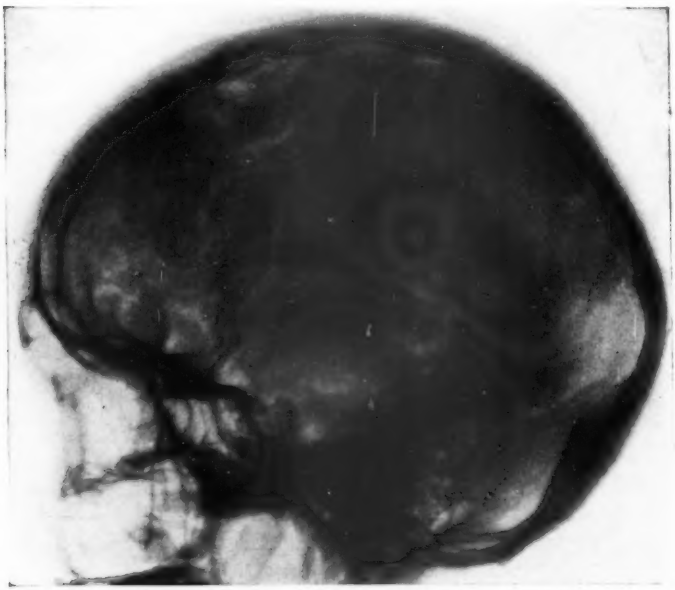


Fig. 477.—Mrs. J. L. H. Lateral view showing thickening of the skull at the vertex and the distended diploic veins with a flattening of the lateral sinus.

clips. We have used these clips for control of hemorrhage for some years, with saving of time and great reduction of instruments used. The flap was elevated, turned backward, and fixed with towel clips. The wound margins were then walled off with towels and a trephine opening made in the skull to the left of the midline. A Swiss trephine was used for exploratory purposes, a

1½-inch button being removed. The upper edge of the button was found to be attached to the tumor mass. The skull was gently removed from around the tumor mass, a piece of the skull about 1 inch in diameter was left attached to the dura overlying the tumor mass. At this time no further attempt was made to remove the tumor. The wound was closed with interrupted linen sutures. One thousand cc. of Ringer's solution was given subcutaneously during the operation.

A second operation was performed May 6, 1929. The old incision was opened and the dura again exposed. The dura at this operation was opened by an elliptical incision external to the tumor mass. Immediately after the opening of the dura the patient collapsed. Seven hundred cc. of salt solution were given intravenously, followed by 300 cc. of citrated blood. The patient left the surgery in a very critical condition. Her hemoglobin continued to drop until it reached 45. Repeated blood transfusions brought it back, however, so that on May 11th the final operation was done.

During the final operation 250 cc. of citrated blood were given intravenously. The old incision was reopened and a large tumor mass (Fig. 478) was removed from the perisagittal region of the left side. There were no complications associated with this operation and the patient reacted nicely to the blood transfusion.

This patient had a rather stormy convalescence. She was placed upon a high-calorie diet, rich in liver, and gradually her hemoglobin percentage rose and she left the hospital in excellent condition.

It has now been almost a year since her operation. She has had two attacks, but they have been very light in character and she has not suffered any inconvenicnce about the region of the operation. Her foot has returned practically to normal. She still has a little dragging of the foot as she walks, but aside from that has practically no discomfort.

Comment.—These tumors, as a rule, are easily diagnosed and when properly operated upon in the early stages are not dangerous. It is only when the tumor has become rather massive and

too much is attempted at one operation that sudden death results.

In these cases the diagnosis is first of all the important point. The utmost precaution must be taken in making a very careful survey of the situation prior to any surgical procedure. Frequently the *x*-ray alone is sufficient to make a very accurate diagnosis. However, the tumor does not always show and a very large and extensive tumor may be present when the *x*-ray appearance would suggest only a small tumor. The skull may

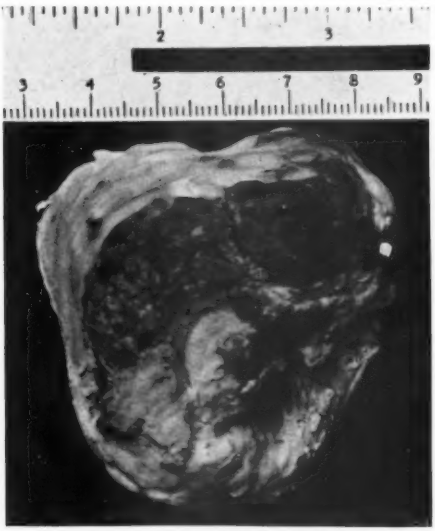


Fig. 478.—Mrs. J. L. H. Endothelioma removed at second operation.

be very thick or it may become eroded, the tumor mass may bulge through, similar to a sebaceous cyst.

The use of air in the diagnosis is not dangerous if slowly and carefully done. In our clinic we use the indirect or intraspinous method rather than the direct method, which is usually employed. We found the direct method to be entirely too dangerous, whereas the indirect method, if properly done, is practically free from danger. We make it a point never to

remove more fluid at a time than 5 cc. In this case but 3 cc. of fluid were removed at a time, replacing immediately with 3 cc. of air. We followed with the withdrawal of 3 cc. more and continued until approximately 30 cc. were injected. In our experience 15 to 30 cc. are ample for diagnostic purposes. If the air does not go into the ventricles then one can proceed with a direct injection of air. It is only in tumors blocking the aqueduct that we find it necessary to resort to this procedure.

After having made the diagnosis and the estimation of the size of the tumor, the next question is how far to go with each operation. In our experience the first danger of sudden death occurs soon after induction of ether anesthesia; second, immediately after opening the dura; third, from severe hemorrhage at the time of the removal of the tumor; and fourth, several days after removal of the tumor.

Since the first danger is that of anesthesia, it is well to use local anesthesia for the first two stages of the operation. If the patient is unwilling, it is our custom to use ether without preoperative medication.

The second danger point, when the dura is opened, we have overcome by refraining from opening the dura at the time of the initial operation. If, at the first operation, the bone only is removed and the dura left intact, there is no danger from sudden shock. At the second operation the dura is opened very slowly. This allows for a gradual expansion of the tumor mass and compressed brain tissue, readjustment of ventricles, and vessels.

The third danger point is the removal of the tumor mass. The use of the electro surgical unit in removing all brain tumors has practically done away with danger from hemorrhage in these cases. The tumor can be shelled out gradually and any bleeding that occurs then becomes a superficial bleeding and can be controlled by hot packs and coagulation.

Sudden death several days after removal of an endothelioma is hard to explain. It does not usually occur in the small tumors.

Case II.—The second case is a man fifty-one years of age, a farmer, referred by Dr. Burkes of Portland, Oregon, with a diag-

nosis of endothelioma of the right parietal region. He gave a history of extreme nervous tension from which he had not relaxed for a period of two years. He had had gastric disturbance, loss of sleep, and weight for the past two years. He had consulted many doctors in various clinics and always the diagnosis had been associated with his gastric disturbance. He had had several gastro-intestinal studies, but never had had an *x*-ray of the skull

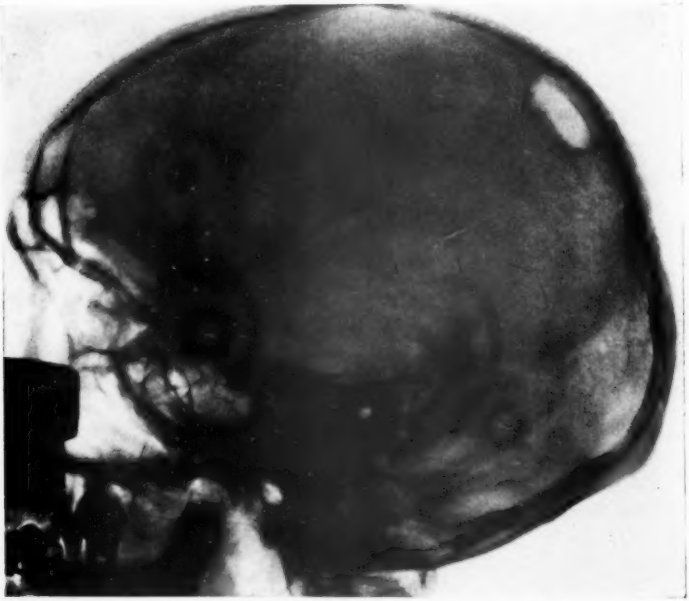


Fig. 479.—*x*-Ray showing erosion in skull as the result of embryonic cyst.

until the one taken by Dr. Burkes which, as you see, shows a definite defect at the site of the tumor mass (Fig. 479).

The examination prior to operation was as follows: "The skin on the forehead is dry and scaly. There is a fairly well-developed dermographia on stroking the skin over the body. This is of short duration. Neurological examination shows the pupils moderately contracted, sluggish to direct light, but equal in size and fairly regular in outline. The retinal vessels are some-

what enlarged. There is a moderate degree of edema of the optic disks, but not a true choke. Vision 20/20. Examination of the reflexes shows the deep reflexes to be equal but slow. There are no pyramidal tract signs present and the sensorium is intact. There are no other neurological findings.

"There is a definite pulsating mass in the region of the right parietal eminence. This mass is not movable, apparently fixed firmly to the scalp and to its bony wall. It is about 1 inch in diameter. *x*-Rays show a skull defect in the posterior portion of the right parietal region. This is about 1 inch in diameter. The margins are smooth. There is evidence of an exostosis above as well as below."

The spinal puncture showed the pressure to be 12 mm., upright position, fluid clear. Cells four; Nonne negative; Wassermann negative. No air was used in this case.

With no increase in the intraspinous pressure, and the positive *x*-ray findings, a small rather than a large endothelioma was suggested. The fulness of the optic nerves, the presence of periodic gastro-intestinal disturbances, suggested the probability of a fairly marked edema of the brain rather than a large tumor mass.

Operation was done February 27, 1930, at Columbus Hospital, under local anesthesia, using novocaine. The incision was made through the skin and periosteum for a horseshoe flap, with the base down. With careful dissection the skin with the superficial tissue was separated from the hard mass and with a sharp periosteal elevator the tumor was separated from the margins of the skull defect. With a rongeur this defect was opened for approximately $\frac{1}{2}$ inch around the entire mass (Fig. 480). This left a defect in the skull approximately 2 inches in diameter. The margins of the bone could now be seen to be not perfectly straight, but a definite lipping both above and below could be felt. The tumor mass fluctuated and a diagnosis of a dermoid cyst was made. In an attempt to elevate the margin of the tumor mass the capsule ruptured and the typical desquamated epithelial matter characteristic of a dermoid cyst extruded from the mass. With a spoon this mass was removed,

leaving the sac of the cyst *in situ*. Careful palpation revealed a nodular mass below and fearing that a second nodule had forced itself inward the dura was opened and the entire cyst wall re-

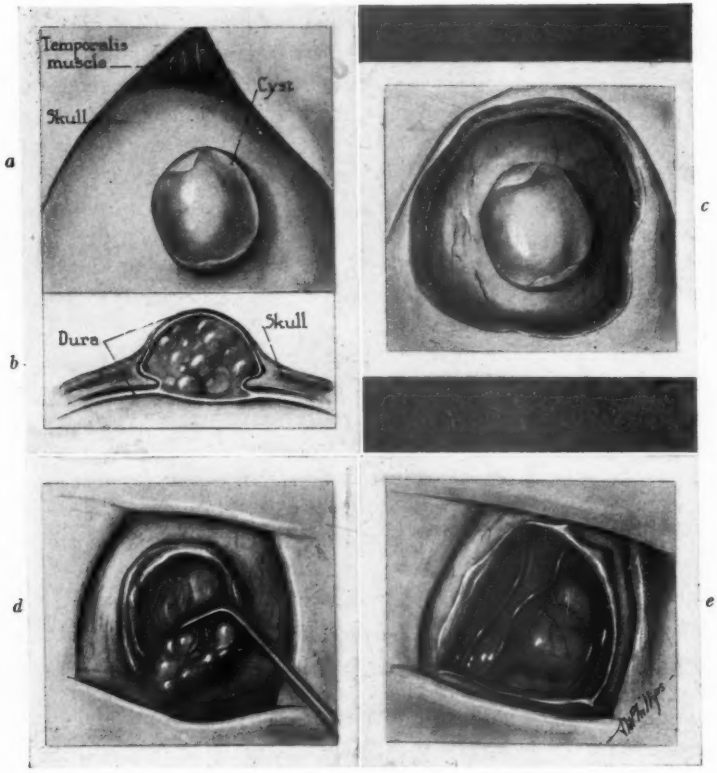


Fig. 480.—(*a*) Appearance of the cyst when the skin flap was turned back. (*b*) Schematic section showing relations of the cyst. (*c*) The bone has been removed around the cyst. A small piece of bone can be seen clinging to the cyst on two sides. The dura is thick and congested. (*d*) The cyst is being avacuated, revealing the parietal layer of dura. (*e*) Cyst wall has been completely removed, revealing marked subarachnoid edema.

moved. Underlying this cyst, which apparently had pressed downward on the large vessels leading to the longitudinal sinus

in this area, was an enormous lake of subarachnoid fluid. This gradually subsided without the necessity of puncture after removing the pressure, so that at the end of some twenty-five minutes a practically normal appearance of the cortex and vessels was obtained. The wound was closed with interrupted silk sutures.

The patient made an uneventful recovery. Strangely enough, immediately after the operation and before the patient knew the

Fig. 481.—Microscopical section of cyst.

nature of his condition, he stated that he felt quite relieved about the head. This persisted and he left the hospital in excellent condition.

Microscopical section of the cyst wall, as reported by the pathologist, Dr. V. Cefalu, is as follows:

"The wall of the cyst is composed essentially of fibrous tissue of a rather hyalin type. There are numerous dilated

lymph spaces and a few scattered lymphocytes. The inner surface shows occasional patches of flattened cells of endothelial or mesothelial character, having small dark oval nuclei, and considerable cytoplasm. There are occasional patches of calcification in the wall. The process can be explained only on the basis of a cyst of developmental origin" (Fig. 481).

EXTRADURAL DERMOID CYST OF THE LEFT PARIETAL REGION

NEUROSURGICAL CLINIC, SEATTLE, WASHINGTON

THE third case in this series, referred by Dr. Homer Wheelon of Seattle, is an extradural dermoid cyst of the left parietal region. The patient is a woman twenty-eight years of age, whose complaints were: Amenorrhea, left temporal headache, obesity, tachycardia, and a soft, fluctuating area on the left temporal region which was exquisitely tender and at times caused puffiness of the scalp over that area.

The history of this patient has to deal with dyspituitarism as the predominating feature, for which she had been treated by Dr. Wheelon for several years. She gave a rather definite history of typical migraine associated with diplopia and severe headache and particularly throbbing of the left side of the head. She had the usual menstraul disturbances associated with dyspituitarism and also hypogonadism and hyperglycemia. The tumor mass which had eroded through the skull felt firm, about 2 cm. in diameter, and did not flucuate nor pulsate.

A diagnosis of either an endothelioma or a dermoid cyst of the skull was made. The *x*-ray shows the erosion of the skull to be approximately 2 cm. in diameter and irregular in outline. Air, by the intraspinous method, was used in making the differential diagnosis. The pressure was 20 mm. of mercury in the upright position, 10 cc. of fluid were removed, and 10 cc. of air injected in 5 cc. amounts. The anteroposterior view shows the air in both ventricles, equally distributed, with no displacement and no enlargement in the size of the ventricles. This definitely established the fact that the tumor was a cyst, eroding the skull, rather than a large endothelioma which would cause the left-sided headaches which the patient had over a period of years.

At the King County Hospital, May 3, 1930, a flap was turned

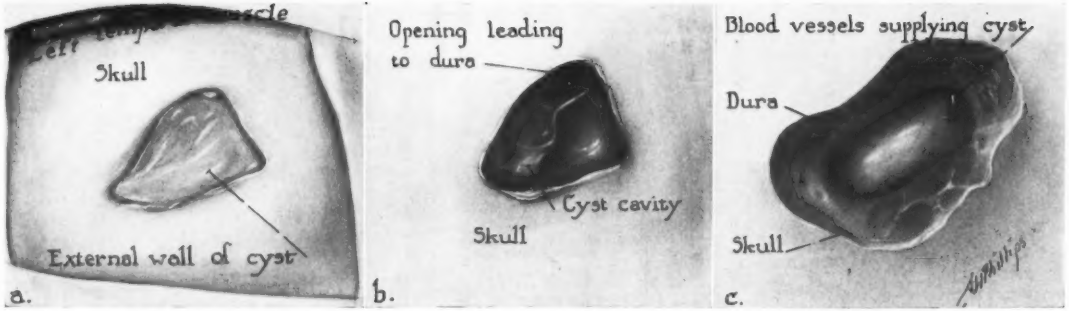


Fig. 482.—Extradural dermoid cyst of the skull. (*a*) Appearance of the cyst after reflection of the scalp and periosteum. (*b*) Showing the deep erosions, the shell of the inner table of the skull and the opening leading to the dura, after the contents of the cyst were evacuated and the cyst wall removed. (*c*) Normal dura appears. The lower margin of the skull had to be beveled due to the extent of the erosion of the inner table. Blood vessels sprung from the vessels of the dura to supply the cyst wall.

down over the left parietal area, revealing the tumor mass and erosion entirely through the skull, the edges of the skull being sharply outlined and beveled. A nick was made in the outer capsule and the contents of the cyst removed with a spoon and by irrigation. Examination of the contents showed it to consist entirely of cholesterin and lecithin. The thin wall on the under surface was stripped from the remains of the thin bony layer, revealing its attachment to the dura at the upper and inner pole. The skull was much thicker than normal and after beveling off the sides the dura was exposed and the vessels which led to the cyst wall were ligated with silk. The dura appeared to be normal and was not opened.

Comment.—These 2 cases of dermoid cyst, one intradural and the other extradural, are not uncommon. Their chief interest lies in the differentiation between an endothelioma and a dermoid cyst. Their chief symptoms are tenderness over the area and the occasional puffiness of the scalp. There are no complications after removal.

CLINIC OF DR. W. A. TAYLOR

THE TAYLOR-RICHARDSON-HICKS CLINIC, ELLENSBURG, WASHINGTON

FRACTURES OF THE SPINE

WE have for our consideration today 3 cases of fracture of the spine. As you all know, due to the great increase in the number of automobile accidents, the incidence of fractures of the spine has increased, and at the same time there has been a proportionate increase among women. In this locality where we have a large number of men employed in the coal mines and in the lumber camps, we probably see more than the usual number of these cases. We are fortunate enough to be able to report our experience in 29 cases of this unfortunate accident.

While fractures of the spine may be due to direct violence such as a bullet wound, or a stab wound, the most frequent cause is indirect violence due to a fall upon the head or buttocks, or a heavy object falling upon the bent shoulders while the individual is in the stooping posture, the force of the blow causing a hyperflexion or hyperextension of the spine. The resulting fracture does not occur at the site of the blow, but at the point of greatest flexion which is found at the junction of the fixed and movable portions of the vertebral column, usually the dorsolumbar junction. The majority of fractures of the spine occur between the ninth dorsal and the second lumbar vertebrae. Sixty per cent are found below the tenth dorsal vertebra.

Extreme muscular contraction of the extensor muscles of the spine, as in twisting to escape a fall, may be the cause of chip fractures of the lumbar vertebrae, or of fractures of the spinous or transverse processes. Fractures of the transverse processes are found almost exclusively in the lumbar region, where the processes are long and slender and are exposed to injury. The accident is usually due to direct violence.

Fractures of the spine, especially those of the axis and atlas, may be so serious as to cause immediate death. Fractures of the atlas were formerly considered to be almost invariably fatal, but recent advances in roentgenographic technic have not only demonstrated that this injury is more frequent than was formerly thought, but that the mortality rate is not as high as we have been led to believe. The mortality rate, however, is still over 55 per cent and is markedly increased when the injury is complicated by a fracture of another vertebra.

The danger in fracture of the spine is due to injury of the spinal cord. The closer the fracture is to the medulla oblongata, the more serious it becomes, and the nearer the fracture is to the lower end of the spinal column, the less serious is the immediate result. In fractures of the cervical vertebrae, death is due to interference with the medulla. Hypostatic pneumonia is the usual cause of death in fractures of the upper dorsal vertebrae. Cord injuries are also especially frequent in this locality, as this is the narrowest portion of the spinal canal. Cystitis, pyonephritis and exhaustion are the most frequent causes of death in fractures involving the dorsolumbar region.

Spinal fractures may be single or multiple. In one of our cases there was a fracture of the bodies of four vertebrae, with a sound vetebra intervening. Multiplicity of fractures in this case probably saved the man's life, for if the entire force had been expended on one veretbra, there would undoubtedly have been either a complete severence of the cord or a transverse myelitis.

It is possible to have a crushing fracture of one or more vertebrae without injury to the cord. The symptoms of this type of injury may consist of severe shock, kyphosis, and complete total disability, the roentgenograms showing a crushing of the body of one or more vertebrae. In other cases the injury may be so slight as to escape notice and the only subjective symptoms may be a severe pain in the back, which is very frequently diagnosed as "lumbago," or as a neurosis. This type of injury was very frequent following the World War, and it has been termed "latent fracture" by French surgeons. These patients frequently develop delayed symptoms after weeks, months or

years, which may completely incapacitate them. Unless perfect *x*-ray pictures are obtained fractures may escape attention until later symptoms develop.

Injuries to the cord may be partial or complete. In partial lesions the symptoms appear gradually, motor paralysis is limited, some sensation is present, and paralysis of the bladder and rectum is not always present. The symptoms of complete lesions appear immediately, there is complete motor paralysis below the site of the cord injury, sensation is entirely gone, and there is complete paralysis of the bladder and rectum, with retention of urine. It must be remembered that hemorrhage and edema may produce symptoms which may simulate a complete lesion of the cord.

While there is no infallible guide to the extent of the cord injury, certain clinical tests are of value. Complete sensory paralysis below the lesion may be demonstrated by taking a pin and carefully drawing it around the toes of both feet. If the patient is unable to distinguish any sensation or pain, and if he has no knowledge of which toe, or what part of the foot, has been touched, there is usually a complete lesion of the cord, and in our series all of these cases have died. The Queckenstedt test may be used to confirm the diagnosis.

In the clinical diagnosis of the site of the cord lesion it is important to remember that the points of origin of the spinal nerves are somewhat higher than their points of exit from the spinal canal. The lower the nerve, the longer its intraspinal course.

The extent of the cord lesion is not always proportionate to the bone injury. The amount of compression of the vertebra, as shown in the roentgenograms, does not necessarily correspond to the amount of injury to the cord. This was well illustrated in two of our cases. The roentgenogram of Case I showed a marked displacement, yet the cord injury was slight and the only neurological symptom was a partial paralysis of the left foot. There is very little compression to be seen in the roentgenograms of Case II, yet there was a total paralysis below the cord injury, and the patient died a few days later. In this

case the cord was probably severely injured by a fracture dislocation, the displacement being partially reduced before the roentgenogram was made.

The diagnosis should be based upon the following: History of the injury, persistent pain due to pressure upon the spinal nerves, kyphosis, symptoms of cord injury, crepitus, and the demonstration of a point of exquisite tenderness. History, symptoms of cord injury, and good roentgenograms are the most important.

When a patient is seen immediately after an accident which suggests an injury to the spine, he should be handled as gently as possible in order that the fragments are not displaced in such a way that they will cause serious injury to the spinal cord. He should be laid on a flat rigid bed, or, better still, on a mildly convex Bradford frame.

Good roentgenograms should be made in every case in which there is the least suspicion that there may have been an injury to the spine. This rule is too frequently neglected because the accident appears trivial and the symptoms are so mild that they are neglected. This precaution not only protects the reputation of the surgeon both professionally and in a medicolegal way, but, what is much more important, it guards against overlooking slight fractures which, if neglected, may give rise to such delayed symptoms as Kümmell's disease. It also assures that the patient receives adequate treatment at an early date. If the patient is dangerously ill, it is better not to disturb him, but to wait a few days before attempting to locate the exact site and extent of the injury. The first roentgenogram may be negative, and the second may show clearly the lesion. Both anteroposterior and lateral views should be made in all cases. Lateral views are by far the most important, as anteroposterior views may be absolutely negative, and a lateral view demonstrate the lesion. Stereoscopic views should be taken in all doubtful cases. All regions of the spine should be roentgenographed to eliminate multiple fractures.

Abdominal pain and tympanites may be the outstanding symptoms and may be so severe as to simulate an injury to the

abdominal viscera. This condition is due to pressure upon the spinal nerves and is always an indication for hyperextension, regardless of the apparent deformity. It is usually relieved by placing the patient on a convex Bradford frame.

In Pott's disease the intervertebral disk is involved early, while it is more apt to remain intact in case of a fracture.

Our series includes 11 cases which developed an immediate and complete paralysis. Six of these received operative treatment, a laminectomy being performed in 5. All patients in this series died regardless of the type of treatment employed. The longest time that any patient lived was twenty-one days after the accident.

Another series of 12 cases, all of which showed some compression and deformity and 5 of which showed a partial paralysis, were all treated conservatively without an operation, and all recovered. They were able to return to a gainful occupation, although there was a certain percentage of disability.

Operative treatment is rarely indicated in fractures of the spine. In our experience all cases with complete paralysis have died regardless of the treatment employed, and all the cases with partial paraysis have cleared up satisfactorily with conservative treatment. We recognize, however, that an operation may occasionally be of some benefit in removing a spicule of bone or other pressure that is causing a partial paralysis. Also, in cases which, immediately after the injury, have a partial paralysis which is followed in a short time by a complete paralysis, an operation may prove satisfactory.

We treat our cases on a slightly convex Bradford frame and apply extension and counterextension above and below the fracture. This method of treatment was originally reported by the late Dr. Langworthy. We doubt very much whether the extension is of much value in pulling the spine into line, but it does overcome muscular spasms and is of some value in relieving abdominal pain by opening the foramina in the spinal canal and thus removing the pressure from the spinal nerves. The length of time that these patients must be kept on the convex Bradford frame varies in individual cases. In our series the best results

were obtained in the cases that spent the shortest time in bed, and in this type of injury, just as in fractures in other parts of the body, early mobilization gave the best results. Taylor braces may be worn for some months, but these were not employed in our cases.

Catheterization of patients with a complete paralysis should be avoided if possible, as it is certain to lead to infection which will not only make the patient more uncomfortable, but will tend to hasten the end. It is much better to allow the bladder to overflow or to induce suprapubic drainage. In a great majority of our cases with total paralysis we have been able to empty the bladder by manual pressure over the suprapubic region. This is a simple method which saves time and is very useful in these cases.

The following cases will show some of the functional results obtained in this series:

Case I.—A. T., white, male, age forty-five years, logger. Injured by being thrown from a wagon on August 23, 1928.

Examination on Admission.—Severe pain over upper three lumbar vertebrae, greatly increased by movement. No local evidence of injury except the pain. No paralysis, hyperesthesia, or anesthesia. Reflexes normal. Abdominal pain which was so severe that he insisted that the injury was to his abdomen. Pain persisted for one week. Bladder and gastro-intestinal tract both functioned normally. There was very little shock. Roentgenogram showed compression fractures of the bodies of the second and fourth lumbar vertebrae, without lateral displacement.

Treatment.—Rest in bed for twelve days, after which he insisted on returning to his home where he spent most of his time in bed, but was up at will.

Three months after injury the function of the back was excellent, but there was still some tenderness on pressure. One year after injury the function had almost completely returned.

A

B

C

D

Fig. 483.—A, B, C, D. Illustrations showing functional result in Case I.

Case II.—Mrs. L., white, female, aged twenty-eight years, housewife. Injured in an automobile accident August 5, 1929. Admitted to the hospital thirty minutes after the injury.

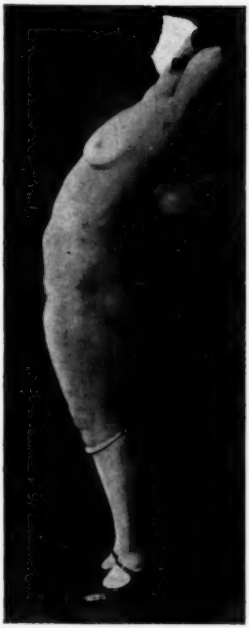
Examination on admission: Patient was in moderate shock. Extreme pain in lower dorsal and lumbar regions as well as in right leg. Partial paralysis of right leg. Patellar reflexes exaggerated and ankle clonus present. Roentgenogram (Fig. 484) showed a fracture of the first lumbar vertebra with compression of its body, and an anteroposterior displacement.

Fig. 484.—Roentgenogram of Case II, showing a compression fracture of the first lumbar vertebra, with anteroposterior displacement.

Treatment.—Patient was placed on her back on a Langworthy frame, with traction on both the feet and neck. Traction was removed at the end of five days as the patient objected severely to it. Abdominal pain and tympanites were very severe for seven days, after which they gradually subsided. Retention of urine for forty-eight hours except by catheterization. On August 16th she developed a phlebitis of both legs, with a rise of temperature to 102.8 F. This gradually subsided in two weeks. Patient was up in a wheel chair on October 29th and was dis-

A

B



C

D

Fig. 485.—A, B, C, D. Illustrations showing functional result in Case II.

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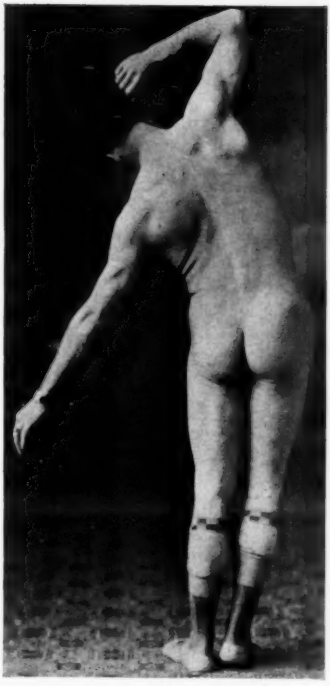
charged on October 30th. Examination nine months after the injury showed an almost perfect functional and anatomical result and the roentgenograms showed no anteroposterior displacement.

Case III.—H. H., white, male, age twenty-seven years, logger. Injured by a rolling log on September 5, 1927.

Examination on admission: Patient in a state of shock and suffering with severe pain in the mid-dorsal and upper lumbar regions, as well as over the entire abdomen. Sensation of constriction of the chest, numbness of the right leg, and tingling of the left leg. Severe contusion, with subcutaneous hematoma

Fig. 486.—Roentgenogram of Case III showing fractures of the bodies of the second and third lumbar vertebrae. Slight lateral displacement.

over the first and second lumbar vertebrae, spasm of the abdominal muscles to a boardlike rigidity, paralysis of the right leg, complete except for a faint movement of the toes with extreme effort. Left leg moved with difficulty. Patellar reflexes both exaggerated. Ankle clonus present only on right side. Anesthesia of right leg and hyperesthesia of abdomen. Roentgenogram (Fig. 486) showed fractures of the bodies of the second



A

B

C

D

Fig. 487.—A, B, C, D. Illustrations showing functional result in Case III.

and third lumbar vertebrae, with marked compression of the body of the second, but very little lateral displacement. Urine passed involuntary shortly after admission, but retention appeared in twelve hours and lasted for ten days, except when he was catheterized. Extreme abdominal pain for six days. Abdominal rigidity diminished in twenty-four hours and was replaced by marked tympanites which lasted for two weeks. Vomited all food and water for first twenty-four hours. Girdle pain in region of fracture, which increased for seventy-two hours and then subsided gradually. Pain in right knee joint for two weeks.

Treatment.—Placed on back on a Langworthy frame with traction on both the feet and neck. Shock and acidosis were treated by intravenous saline and glucose. Traction removed at the end of one month. Gradual return of function of right leg at the end of third week. Up in wheel chair on November 21st, and walking on crutches on December 15th. Discharged January 9, 1928, walking on crutches. Six months after injury patient walked easily with a cane, and with only a slight stiffness of the lumbar spine. One year after injury patient walked without a cane and with excellent back motion in all directions.

In order to secure good functional results in fractures of the spine the diagnosis should be made early. If recognized and properly treated, they do remarkably well; if neglected, they become and remain cripples.

Full recovery of function rarely, if ever, occurs. There is usually some lack of flexibility and the individual is frequently unable to resume heavy lifting. The functional result depends more or less upon the economic situation of the patient. A man who is a hard-working miner or logger, and who has considerable compensation insurance, takes a more pessimistic outlook on the situation than the man who has no compensation insurance. It is quite true that the man who is engaged in heavy work suffers a considerable amount of permanent disability. The man who has no compensation insurance and relatively light work is usually able to resume his former vocation.

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CLINIC OF DRS. C. G. TOLAND AND W. P. KROGER

ST. VINCENT'S HOSPITAL, LOS ANGELES, CALIFORNIA

CANCER OF THE THYROID

IN a rather brief review of the recent literature on malignant goiter it was noted several authors have been apologetic in expressing radical views on treatment. In our present-day knowledge of the treatment of any malignancy the keynote must be as complete an eradication as possible of the primary focus.

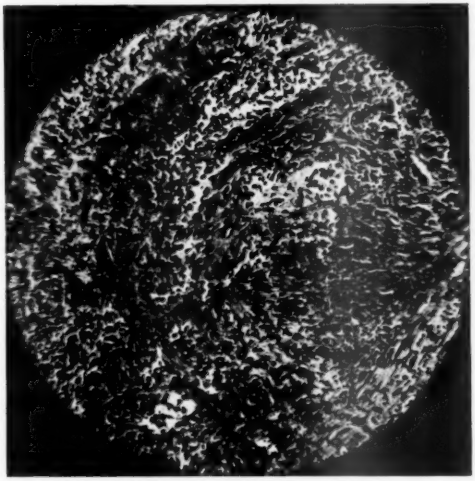

Fig. 488.—Carcinoma of thyroid. Many irregular spaces completely filled with atypical epithelial cells in a cellular, fibrous tissue stroma.

The thorough removal of the offending growth before metastasis has occurred is the only complete cure that can be offered to the patient. Where there is doubt as to the malignancy of a tumor, the accepted rule is to excise and transfer the responsibility to

the pathologist. In fact it is consistent with good surgical judgment to remove practically all tumors even though they are obviously benign.

This procedure is accepted without question when applied to growths such as breast tumors, and it seems logical that a similar attitude should be taken toward the adenomatous tumors of the thyroid. Too frequently the patient with an apparently

Fig. 489.—Recurrent carcinoma. Age sixty-three years. Goiter for twenty-five years. Duration of malignancy ten months. Was preceded by influenza. Had thyrotoxic symptoms. Lost 70 pounds. Basal metabolic rate, plus 32. No obstructive symptoms. Operation 9/4/29. Recurrence three months later. *x*-Ray treatment of no value. Died 4/1/30.

innocent small adenomatous goiter is advised to defer treatment until troublesome symptoms such as pain or pressure occur. In about 2 per cent of cases those troublesome symptoms will be caused by a carcinomatous degeneration, and the situation will most likely have progressed beyond any surgical aid.

When a positive preoperative clinical diagnosis of malignancy can be made it is almost certain the tumor has extended through the thyroid capsule and it will be useless to attempt any surgical procedure other than some palliative measure, such as a decompression, in cases having distressing pressure symptoms.

Malignant tumors of the thyroid occur more frequently than generally is believed. The incidence varies somewhat in different localities, the European writers reporting a higher incidence than was found in this country. Kocher reported a

Fig. 490.—Malignant adenoma. Age seventy-six years. Goiter for eight years. Duration of malignancy seven months. Symptoms of dysphagia and hoarseness. Loss of weight. Right vocal cord paralyzed. One fourth of pharynx filled with mass. Thyroidectomy advised six years ago. Receiving *x*-ray treatment with some improvement.

percentage of about 7.45, while the incidence among surgeons in America averaged about 2 per cent. In our experience the incidence was about 1.3 per cent.

As a rule, malignancy of the thyroid is preceded by a benign adenomatous goiter, usually of several years' duration. It has been authoritatively stated that in about 90 per cent of cases the premalignant adenomatous goiters are of the "fetal type." Occasionally the neoplasm develops primarily upon the normal thyroid tissue.

A distinct predisposition of the development of the malig-

nancy following acute infections has been noted by several writers. Carrell Billard stated that many times the malignancy started after an attack of la grippe. Seven of our cases definitely stated that a severe acute respiratory infection, which was called influenza, occurred shortly before the sudden increase in size of the goiter denoting the inception of the cancer.

What significance should be attached to this rather interesting observation we will leave for the decision of some future investigator.

No two pathologists seem to agree on a definite classification of malignant tumor of the thyroid, and there still seems to be some confusion as to the differential factor in the microscopic picture of certain benign goiters and a malignant process. Several authorities state the only single criterion of malignancy before the occurrence of metastasis is invasion into the blood vessels and the appearance of tumor cells within their lumens.

For all practical purposes the great majority of the tumors can be classified either as malignant adenomas or as carcinomas. Sarcomas occur very infrequently.

As in the benign thyroid enlargements, the histologic picture of the neoplasms may vary greatly. In many cases the invasion of the tumor cells into the gland has become so diffuse as to make it impossible, from single sections, to recognize their thyroid origin.

The usual course of these tumors is to penetrate the thyroid capsule and extend into adjacent structures or down into the mediastinum. A compression of the trachea frequently occurs and the esophagus may also be affected. The muscles are invaded, thus destroying the planes of cleavage, and the invasion may extend into the veins, and arteries and around the nerves. Rarely the trachea and larynx are penetrated.

Metastasis occurs relatively late in the disease and proceeds usually by way of the blood stream rather than the lymphatics. The lungs and the bony structures are most commonly affected.

There are no dependable symptoms to indicate the presence of early malignant disease of the thyroid, and frequently a diagnosis is not made until the operation is performed.

Practically all cases note a sudden increase in size of a goiter that had been existing for a number of years. The goiter becomes harder and nodular and is found to be quite fixed in its position.

The early subjective symptoms are those produced by pressure, usually upon the trachea or recurrent laryngeal nerves. Attacks of coughing and choking occur, going on to a dyspnea which becomes particularly distressing on exertion or when lying down. There is usually a troublesome sense of pressure in the neck, and hoarseness is present in about 50 per cent of cases. The patient may have pain in the neck, shoulder, and arm of the affected side. As the disease progresses the symptoms become aggravated and more constant. There will be loss of weight, weakness, and anemia. Occasionally dysphagia occurs.

Usually there is an associated hypothyroidism, but at times a hyperthyroidism will be observed. We noted definite hyperthyroidism in 20 per cent of our cases with basal metabolic rates up to plus 35.

Occasionally a sudden hemorrhage will occur into an adenomatous goiter, particularly in elderly arteriosclerotic individuals. A surrounding thyroiditis will be set up, producing pain, firmness, and fixation. The clinical picture will almost exactly simulate a malignancy and an operation will be necessary to establish the diagnosis.

The treatment of the malignant thyroid disease is attended with only a moderate degree of satisfaction. The results are variable, and are largely dependent upon a number of factors, such as the type of malignancy, the extent of the involvement, and its duration. The operative procedure and the influence of irradiation should be carefully considered and attempts made to apply the proper methods to the individual cases.

Of the various types, the malignant adenomata seem to yield best to treatment. They do not penetrate the thyroid capsule so readily, making a complete excision possible. They also respond well to irradiation.

The carcinomas penetrate the capsule early and usually at operation it will be found impossible to remove the entire growth.

The tumors may be quite soft and cellular, tending to resist irradiation. They recur frequently and early, and at times form fungoid growths. A knowledge of the grade of malignancy is important, particularly to the roentgenologist.

Fortunately the sarcomas occur rarely. They grow rapidly, metastasize early, and resist practically any form of treatment.

Even though cases seem hopelessly inoperable, a biopsy is always justified. The status of the tumor is thus determined and valuable information given the roentgenologist.

It is a distinct advantage to have the attendance of a pathologist at all goiter operations. Occasionally he will discover a neoplasm and more radical procedures can then be immediately instituted. To digress: Not infrequently he will find a parathyroid gland clinging to the specimen, which he will return to the surgeon that it may be implanted in the sternomastoid muscle.

In the advanced cases where there is distressing pressure causing dyspnea, a thyroid decompression or merely the division of the isthmus will be found of value. Irradiation can then be instituted and frequently a considerable prolongation of life obtained. A tracheotomy will sometimes be found to give considerable temporary relief.

Irradiation should be employed in all thyroid neoplasms. The type of irradiation and the technic of its application varies to suit the individual case. In some cases radium can be applied through a drainage tube placed at operation, to be followed later by surface radium packs. The radon needles are only occasionally inserted into the inoperable carcinoma. The needles may give rise to considerable undesirable edema or produce a troublesome infection.

The radium applications may be followed by a course of *x*-rays or the *x*-ray treatments can be used without radium in some cases.

If radium is available, the combination of the two methods gives the best results in the majority of cases. If metastasis has occurred, it should be treated with the roentgen ray.

CLINIC OF DR. RAYMOND E. WATKINS

FROM THE DEPARTMENT OF GYNECOLOGY, UNIVERSITY OF OREGON MEDICAL SCHOOL

PROLAPSE OF UTERUS IN ELDERLY WOMEN

A WOMAN, aged fifty-five, entered the hospital complaining of falling of the womb and vaginal discharge. Her trouble started eighteen years ago following the birth of her last child.

Fig. 491.—Photograph showing prolapse of uterus with large enterocele protruding just below cervix.

For the past two years the prolapse had caused considerable discomfort, the protruding part being tender and bleeding at times. It had been necessary for her to wear a T binder whenever she was on her feet in order to hold back the prolapsed organs. For the past six months there had been a constant,

foul vaginal discharge. She was married at twenty and had had six children. All deliveries had been normal except one, a breech presentation. At this time she was considerably lacerated, but was immediately repaired. Her last child was born twenty-eight years ago. Menstruation occurred normally until the age of forty-one years, at which time she began to have a very profuse flow which recurred every two to three weeks, accompanied by clots. Menstruation ceased at fifty-one years, and she had had no period since. She has had frequency of urination while on her feet and urination has been distressing inasmuch as it caused pressure and a bearing down sensation. She has had no digestive disturbances and her bowels have been regular (Fig. 491). Examination showed the patient to be a white female, measuring 5 feet 4 inches in height and weighing 200 pounds. Her blood pressure was 85 systolic, 65 diastolic. Her pulse was 68, temperature 97.2 F., and respirations 16. Except for obesity the general examination revealed nothing of importance outside of the pelvic findings. Here it was found that the uterus protruded from the vagina and was the size of a large grapefruit. There was an erosion of the cervix at the external os about 3 cm. in diameter. Skene's and Bartholin's glands were normal. There was no discharge at the os. The uterus could be replaced within the vagina, but it immediately protruded again if not held in position. Examination of the prolapsed part showed a marked cystocele attached to the uterus and a large enterocele extending down behind the cervix continuous with the cul-de-sac. (See Figs. 491–496.) When she strained, the entire uterus was forced outside of the vagina and the fundus was easily felt in the prolapsed part. The posterior vaginal wall was short and the perineal muscles markedly relaxed, but there was little or no rectocele present. The blood count and urine were both normal, and the Wassermann was negative.

She was kept in bed five days preoperatively, during which time the vagina was irrigated daily with antiseptic washes. She was prepared for operation and a vaginal hysterectomy of the Mayo type for prolapse was done. The enterocele, which was so pronounced in this case, was treated by dissecting out the

Fig. 492.—Photograph of prolapse of the uterus which on straining showed a large cystocele.

Fig. 493.—Photograph showing prolapse of the uterus with large healed ulcer surrounding the external os.

sac, tying it off (see Fig. 502), and then closing the cul-de-sac in the manner suggested by Dr. George Gray Ward (see Fig. 503). She remained in the hospital twenty days postoperatively and was discharged in good condition.

This case report is more or less typical of the cases to be reported in this paper, which is an analysis of 14 cases of complete prolapse. (See Figs. 491-494.)

In dealing with elderly women in whom complete prolapse has occurred two important problems present themselves.

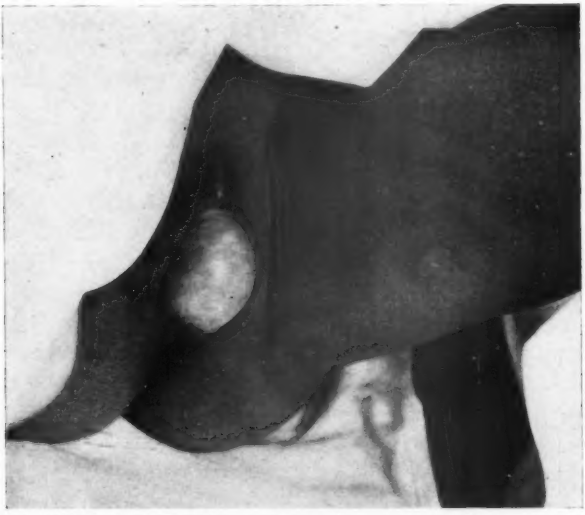

Fig. 494.—Photograph showing prolapse of the uterus with cystocele as the outstanding finding.

First, what procedure is the most efficient, and which offers the greatest chance of permanent cure? Second, what operative procedure can be done with the least shock to a patient of this age?

In answer to the first question a consideration of prolapse is necessary. The term "prolapse" means the falling down of an internal part of the body. This term, while it describes what happens in prolapse of the uterus, often seems to give the im-

pression that the falling part is responsible for the prolapse, and the true etiology, a weakened pelvic diaphragm, is not considered. Prolapse of the uterus is due to a hernial opening in the pelvic diaphragm which allows it to take place. In order to cure any type of hernia the hernial opening must be closed, but in prolapse of the uterus some surgeons frequently overlook or dis-

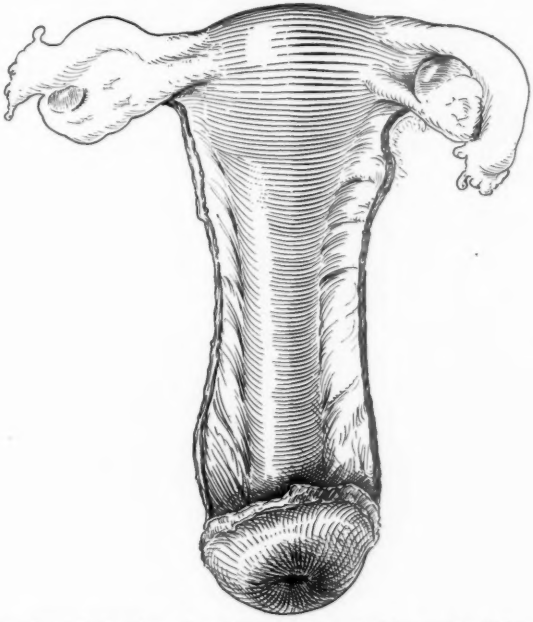

Fig. 495.—Actual drawing of prolapsed uterus showing marked elongation of the cervix.

regard the hernial opening below and attempt to cure the condition by sewing the uterus to the anterior abdominal wall, by removal of the uterus, or some type of ligament shortening combined with a perineorrhaphy. It is not infrequent to see recurrence in patients who have been operated one or more times for prolapse.

One of the most distressing and difficult conditions to deal with is the prolapsed vagina in which a previous hysterectomy

Fig. 496.—Drawing of prolapse of the uterus with a large enterocele complicating same.

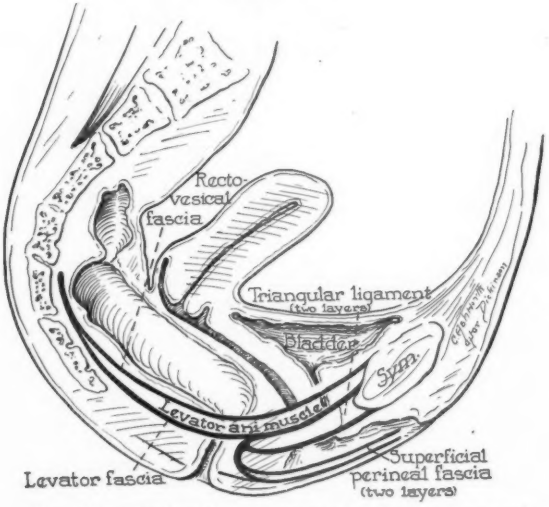

Fig. 497.—The fascial layers in relation to the levator ani.

has been done. Proper restoration of the urogenital diaphragm and pelvic floor by coaptation of the injured parts, or by the use of some other structure to fill in the defect, combined with the obliteration of the peritoneal funnel produced by the prolapse is necessary for a successful cure of this condition.

The cause of prolapse of the uterus is usually primarily dependent upon an injury due to child birth, secondarily aided by weak musculature and fascia. There are many other factors

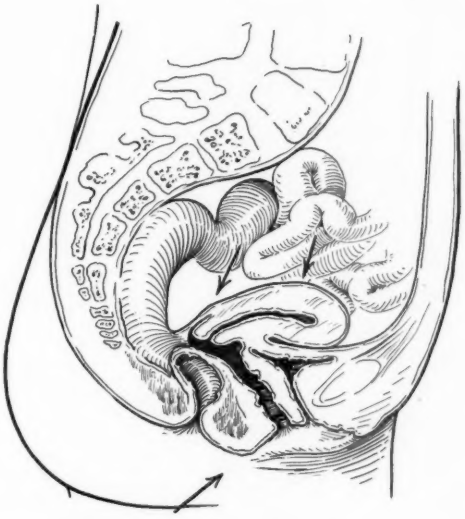

Fig. 498.—Diagrammatic scheme of normal pressure deflection by the intrapelvic planes, and the direction of levator contraction.

which take part in the etiology of prolapse. The part of the pelvic diaphragm involved in this injury is composed mainly of the levator ani muscles with their fascial layers and the triangular ligament (see Fig. 497). These maintain uterine poise and prevent herniation of the genital organs as long as they are intact and uninjured (see Fig. 498). The perineal body plays an important part in protecting the opening of the genital canal by keeping the vagina closed. This genital hiatus, or opening, is closely

guarded by fascial reinforcements. The broad, uterosacral and round ligaments play their part in the physiology of uterine position, but when sufficient injury occurs to these supporting structures the resulting pathology is descent of the uterus. The injury in prolapse is usually a multiple one. The pelvic diaphragm is injured, the uterus drops backward in retrodisplacement, the broad and uterosacral ligaments become stretched, thus allowing the uterus to descend or herniate, carrying the bladder and rectum

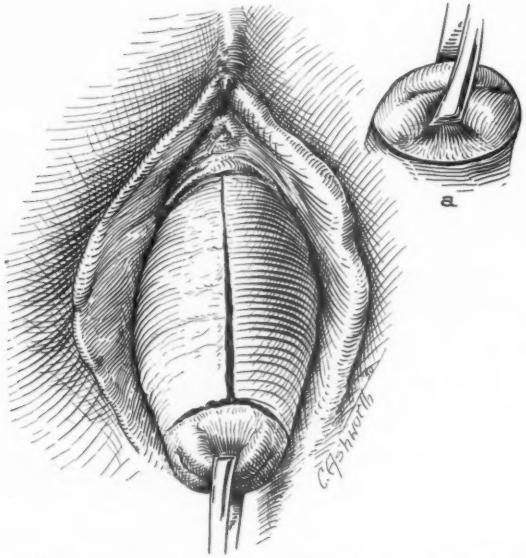

Fig. 499.—T-shaped incision in anterior vaginal wall, the first step in operative procedure. *a*, Incision carried posteriorly around the cervix.

with it. Intra-abdominal pressure is responsible for the descent since it constantly exerts pressure on the uterus, thereby forcing it downward like a wedge through the weakened opening. The prolapse may vary from a slight descent to a complete herniation of the entire uterus, bladder, and rectum.

In this discussion prolapse of the uterus is termed "incomplete" when the uterus and vaginal walls do not extend beyond

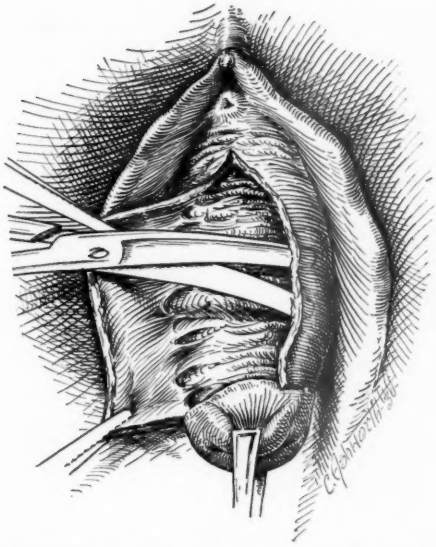

Fig. 500.—Freeing the bladder from the anterior vaginal wall and the uterus.

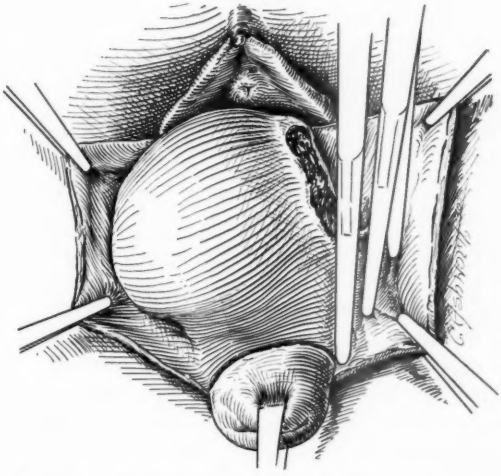

Fig. 501.—Clamping and cutting the broad ligaments in the removal of the uterus.

the vaginal orifice, and complete when the uterus is nearly or completely without the vagina.

Before surgical treatment is instituted all signs of ulceration of the protruding part must be cleared up (see Fig. 493). The patient should be put to bed, the uterus replaced, and frequent antiseptic washes given.

The Mayo vaginal hysterectomy for complete prolapse fulfils the requirements of complete prolapse in elderly women in a very efficient way. In this operation the bladder is dissected

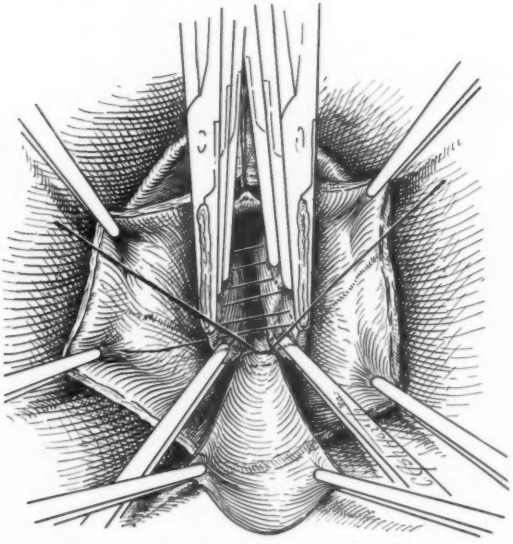

Fig. 502.—Sac of enterocele has been dissected free and is being tied off at its origin. Cul-de-sac closed by this method.

free from the anterior vaginal wall (see Figs. 499, 500), the fundus is brought down, the broad ligaments clamped (see Fig. 501), and the uterus removed. The broad ligaments are then united across the midline (see Figs. 504, 505). When these are united a new floor is formed for the pelvis strong enough to withstand intra-abdominal pressure. The upper end of the united ligaments is sewed to the underlying fascia and to the uppermost

angle of the incision in the anterior vaginal wall below the bladder, which is pushed above the united ligaments to rest on the new floor they form (see Fig. 505). The weakest part of this procedure is at the cul-de-sac. George Gray Ward has made a very important addition to this operation, especially in the presence of a beginning or actual enterocele. It consists of uniting the uterosacral ligaments posteriorly up to the rectum and removing the sac of the enterocele (see Fig. 503). He also ad-

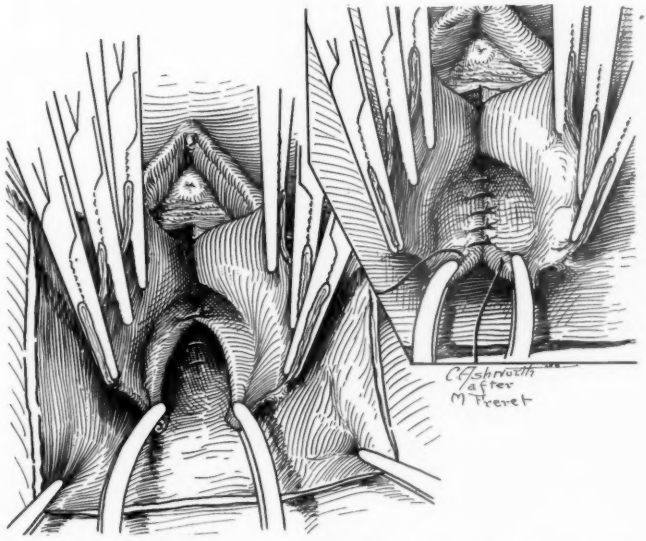

Fig. 503.—Ward's modification of closure of the cul-de-sac; interrupted linen sutures unite the uterosacral ligaments.

vises suture of the upper angle of the united broad ligaments to the periosteum of the pubic ramus about 2 cm. to one side of the midline of the symphysis instead of to the vaginal wall or fascia.

Closure of the cul-de-sac is very important to prevent later development of an enterocele at this point. Experience has taught me that the mattress suture which unites the broad ligaments should start in the uterosacrals with a purse-string suture which picks up the peritoneum in the recess behind these liga-

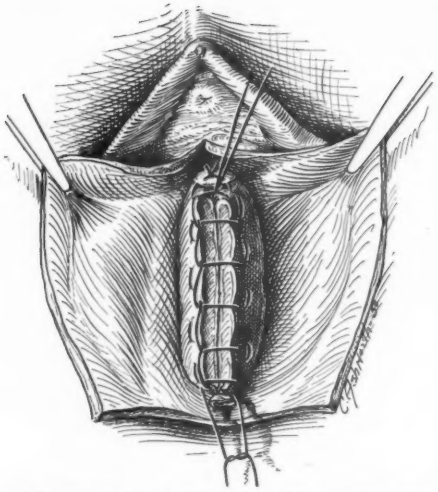

Fig. 504.—Plication of broad ligaments with mattress suture, then a lock stitch. Upper part of plicated ligaments are attached to upper end of vaginal incision and underlying fascia.

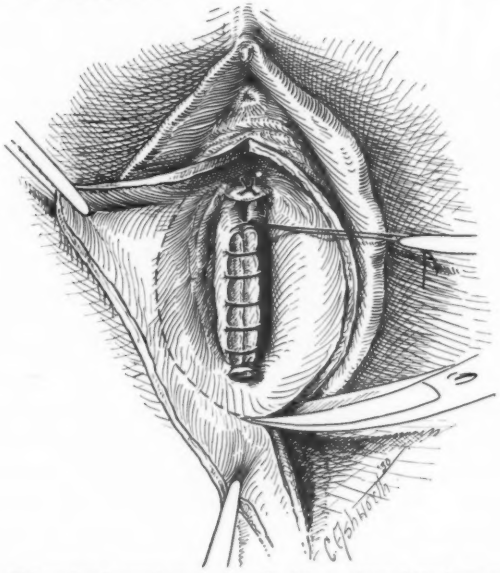

Fig. 505.—Trimming lateral vaginal walls (along dotted line) preparatory to closure.

ments (see Fig. 504). This pocket is thus tightly closed, and the suture can be continued on to the broad ligaments. The remainder of the Mayo operation consists of trimming the vaginal flaps and uniting them in the midline, including a bite of the united broad ligaments with each stitch (see Fig. 505). This operation should be followed by a perineorrhaphy.

The second question is probably best answered by the following reports of fourteen successfully treated cases of prolapse in elderly women. I am including in this group only those cases

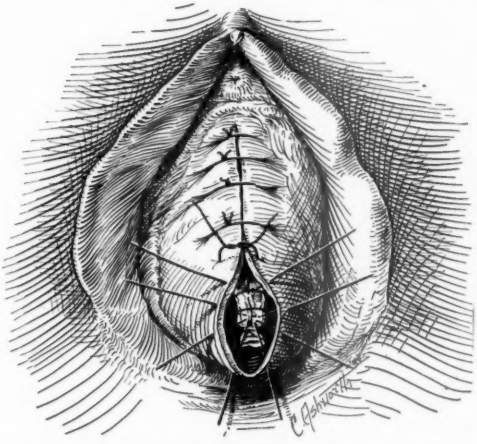

Fig. 506.—Closure of incision in vaginal wall. Each stitch includes a bite of the united broad ligaments.

that I have personally operated upon, and have had opportunity to study before and after operation. Complete prolapse has occurred in about 10 per cent of cases of prolapse of various types.

The average age of the patients was fifty-nine years, the youngest being fifty-one years, the oldest seventy-five years. Ten were housewives, three were housekeepers, one was a cook. The average duration of the prolapse was fifteen years, the shortest one year and the longest forty-five years. Three had had previous operations, one a suspension and perineorrhaphy, the other two, perineorrhaphies. One patient had had

an operation for carcinoma of the vulva, with a complete vulvectomy. A complete prolapse occurred within a year afterward. All had borne from one to eight children. Four stated they had had difficult labors. Eight patients complained of falling of the womb, five complained of feeling of weight. Constipation and difficulty in defecation was present in 5 cases. Bloody vaginal discharge was complained of in 4. Six complained of frequency of urination and difficulty in emptying the bladder. Ulcer of the protruding part occurred in 2 cases. One experienced inability to walk, cramping of the legs, and weakness. The pulse, temperature, respiration, and blood pressure showed no severe deviations, save in one case, in which the systolic pressure was only 85. Ten showed obesity of varying degrees. One patient had a persistent lymphocytosis; one a rather marked arteriosclerosis. All were fairly good risks with the exception of the last two. The abdominal findings were normal in thirteen. Umbilical hernia was a complication in one case. The pelvic findings showed a complete prolapse in each of the 14 cases. All had a marked cystocele, 2 had enteroceles, complicating the cystocele and prolapse. Blood count showed a hemoglobin of 80 per cent or above in 10 cases, 70 to 80 per cent in 4 cases, and red blood cells above 4,500,000 in 11 and above 3,800,000 in 3 cases. Leukocyte count was normal, except in the case before mentioned. Urine was normal in 12 cases. One showed a trace of albumin and a few hyaline casts. Pus was present in only one case, there being from three to twenty cells to a high powered field. All were past the menopause. A Mayo vaginal hysterectomy was done on each of the 14 cases. The hysterectomy was followed by a perineorrhaphy.

Questionnaires were sent to each of the 14 patients inquiring as to the benefits of their operation. The following is the general summary of the follow-up survey to date: Complete success in 10 cases, success with minor abnormalities in 2 cases, and 2 did not reply to the questionnaire. The 2 listed with minor abnormalities had enteroceles recurring. In one a small enterocele was discovered on check up. It was causing no symptoms. In the other an enterocele reaching to the vaginal orifice was easily

controlled by inserting a small rubber ring in the vagina. In neither of these cases was Ward's modification of closure of the cul-de-sac used.

In my experience the Mayo vaginal hysterectomy for complete prolapse of the uterus in elderly women is the most satisfactory of surgical procedures. It is not difficult to perform and offers the least shock and easiest convalescence of any type of correction aimed to bring about a cure. There is no operation for prolapse which gives 100 per cent cures. This operative procedure in 50 cases of complete prolapse as reported by Bullard,[1] of the Women's Hospital of New York, gave 94 per cent complete success and success with minor defects in the remainder.

The Watkins interposition operation for prolapse and cystocele is a splendid procedure where indicated, but should not be used in complete prolapse where the fundus is atrophic and the broad and uterosacral ligaments have been stretched enough to allow the cervix to protrude from the vagina.

Urinary frequency is usually improved or cured by the replacement of the urethra and bladder to a more normal position. When incontinence of urine is present, it should be aimed at individually. Kelly's method of placing sutures at the vesicle sphincter can be easily done at the time the anterior urethral wall is exposed. Since the bladder has been dissected free from the vaginal wall and uterus, the resulting trauma is such that the bladder should not be allowed to become distended. Catheterization every eight hours at least should be carried out. The catheterization of these patients requires the spreading of the lips of the vagina which frequently breaks down the upper part of the perineorrhaphy. A retention catheter is much more satisfactory and may be used following these procedures.

[1] E. A. Bullard, Jour. of Obst. and Gynec., p. 623, v, xi, No. 5, 1926.

CLINIC OF DRS. ALANSON WEEKS AND G. D. DELPRAT

ST. LUKE'S HOSPITAL, SAN FRANCISCO, CALIFORNIA

CASE OF OSTEOCHONDROMA OF THE LEFT GLUTEAL REGION. OPERATION. RECOVERY

THIS patient comes for operation for the spectacular tumor you see growing in the left gluteal region. The tumor is remarkable in its size and in its unusual position on the patient's body. He reported three days ago to the Orthopedic Service of Dr. George McChesney, who is assisting at the operation.

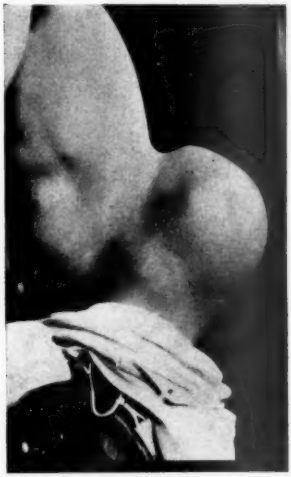

Fig. 507.—Lateral view of patient.

The patient is employed in the capacity of automobile mechanic in the Salinas Valley, and five years ago while helping load a ten ton I-beam onto a truck was struck in the left gluteal region by the beam swinging out of position. The blow was force-

Fig. 508.—Posterior view.

Fig. 509.—Patient after the removal of the tumor.

ful enough to throw the man down and prevent him from resuming his work for four or five hours. The gluteal region on the left soon became swollen and discolored, but as the swelling subsided the patient was inclined to pay little attention to the injury, except that two years later he noted a lump at the site of the blow. The lump was small, painless, and quite hard. The original injury was not reported as an industrial accident. Dur-

Fig. 510.—Typical microscopical field.

ing the five years which elapsed between the time of the injury and the present, when he is before you, the tumor has grown steadily to its present dimensions. It has caused much discomfort, and it is unusual nowadays to find an individual whose laisser faire is so marked. He has suffered much pain particularly during the last six months, apparently from pressure on the left sciatic nerve. He is able to sit only in a twisted position, and needs to have his clothes specially adapted to fit his peculiar

figure. The dread of attracting the public stare would have urged many other men to operation sooner, but the village sages have assured him that he will not survive this operation.

Recently the patient has made application for treatment before The Industrial Accident Commission, but was rejected on the ground that the original injury was unreported. It is interesting to speculate what the award would have been. With decisions that seem to us to favor more definitely the working man it seems very probable that the claim would have been allowed.

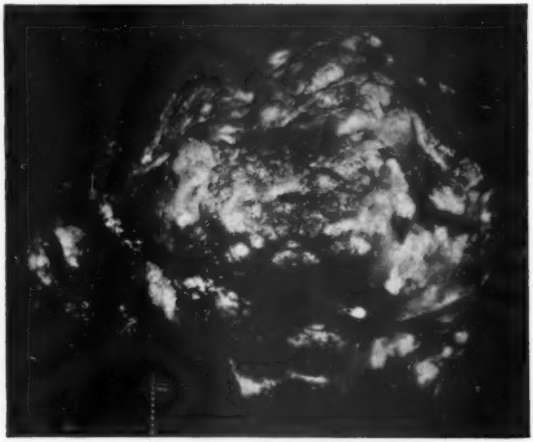

Fig. 511.—Gross appearance of tumor.

There are many cases on record, however, where the cause and effect seem as closely related as in the patient's tumor, where the reverse decision of the court has been handed down. This subject is reviewed in an excellent paper by Dr. P. Stephens,[1] entitled "Trauma and the Development of Sarcoma," in which he concludes: "there is little if any evidence from which we can conclusively assume that such tumors are developed through one act of trauma in which the force is moderate or severe."

The general examination of the patient, except for the tumor,

[1] Stephens, P.: Amer. Jour. of Surg., 5, 364–368, October, 1928.

is essentially negative. He is thirty-nine years old, married, and the father of nine children. His blood pressure is 120/80. The red blood count is 4,970,000, with 83 per cent hemolgobin, and the white cell count is 4450, with 63 per cent polymorphonuclear leukocytes. His urinalysis is negative. The bleeding time is two and one-half minutes, and the coagulation time is three and one half minutes. The blood Kahn test is negative. The patient's blood is grouped for a possible transfusion.

Fig. 512.—*x*-Ray appearance of the tumor.

On examining the tumor we note its position in the left gluteal region. It is very hard and nodular to the general touch, but on palpating carefully we note great numbers of soft, elastic areas. The tumor is not movable, but is attached apparently to the bony pelvis, probably to the wing of the left ileum. The edges of the tumor do not stand out, except at its inferior border, which indicates that it arises beneath the gluteal muscles stretching and thinning them out over its surface. At the lower border

the gluteal muscles sweep up beneath the edge of the tumor to their attachments.

Dr. Lloyd Bryan makes the following roentgenological report:

"There is an extremely large tumor arising from the posterior wall of the left ileum extending out into the soft tissues of the buttock. This shows an irregular mottled area of bony density interspersed with small rounded areas of decreased density. There are apparently some irregular defects in the body of the ileum.

"Conclusion: Extremely large osteochondroma springing from the body of the ileum on the posterior surface."

Aside from the *x*-ray findings we consider the diagnosis must differentiate between osteochondroma and osteosarcoma, and the strongest argument against the latter consists in the absence of areas of necrosis in a tumor of this size and duration. There may be areas which are undergoing malignant changes, but we must wait for the pathologist's report for information here.

The patient, under gas and oxygen anesthesia, is placed on his right side with the left thigh slightly flexed. This brings the tumor into its most prominent position. A long incision is made over the dome of the tumor through a very small amount of subcutaneous fat. Thinned out over the surface of the tumor are the remains of the gluteal muscles, so distorted as to defy identification. Beneath these muscles the tumor is seen to be composed of very hard, cartilagenous masses, white and chalky, and in some places translucent and soft, which squeeze out a jelly-like material on pressure. The resection of the tumor is commenced at the upper and lateral portion by stripping away the overlying tissue. In the region of the posterior iliac spine we find an extension the size of a fist. Dissection is carried around and under this. The muscles are also peeled over the medial side of the tumor. Few bleeding points are encountered. The tumor is now uncovered entirely and we note it is slightly movable as if rocking on a rather small base. It is difficult to undermine this tumor enough to free the base, and dangerous too, since we cannot see the gluteal artery and must avoid tear-

ing it lest it slip through the gluteal notch and bleed in the pelvis. By splitting the tumor in two we have a better approach to the base and this sudden gush of blood is the gluteal artery! Fortunately, it is clamped and now tied. All that remains now is a smaller portion of tumor attached to the ileum. This can be divided with a broad chisel, and the tumor is removed entirely. Some bone wax controls the bleeding from the bone. The redundant muscles cannot be individually identified, but the deeper layers are sewed to the fascia at the crest of the ileum and the superficial layers of muscles are closed along the line of the incision, which allows a rolled rubber drain to pass to the depths of the wound. Large dressings are applied.

The patient's pulse is now 100, having risen from 80 at the beginning of the operation. There is a slight fall of blood pressure. The patient is awake and not in shock. He is to be kept in bed in this same position. He has not lost enough blood to require a transfusion.

The patient made a remarkably uneventful recovery. On the evening of the operation he was free from the sciatic pain for the first time in six months. The wound healed by first intention throughout. For the first few days there was a profuse serosanguineous drainage. The drain was removed on the third day. On the tenth day the patient was allowed up in a chair, protecting the left gluteal region with an air cushion. On the thirteenth day (postoperative) the patient was allowed home. He will be given deep *x*-ray therapy to prevent possible, although improbable, recurrence.

Pathologist's report:

"About three years' duration. Gross specimen is a very large, encapsulated, gray, superficially nodular mass weighing 5100 Gm. and measuring 20 x 20 x 30 cm., of consistency and appearance of rather soft cartilage interspersed with bony fragments. Microscopic section shows fairly adult type cartilage, osteoid tissue, and bone tissue.

"Diagnosis: Osteochondroma. (Dr. Stowe.)"

CLINIC OF DR. PARK WEED WILLIS

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RUPTURED ANEURYSM OF ABDOMINAL AORTA WITH A LEFT RETRORENAL HEMATOMA. SYMPTOMS SUGGESTIVE OF A RIGHT URETERAL CALCULUS

Chief Complaint.—(1) Sudden, severe, colicky pain in the right lower abdominal quadrant. (2) Nausea and vomiting.

Patient had been under treatment for the last five years for high blood pressure, but up until onset of present complaint had not been acutely ill. Twenty-four hours previous to admission to the hospital she was seized with a severe pain in the right lumbar region and right lower abdominal quadrant, colicky in nature, which radiated into the right leg. There was nausea and vomiting. The attack lasted for five hours and was relieved by morphine. There was no hematuria. Patient's history was irrelevant except for signs and symptoms of generalized arteriosclerosis with hypertension.

Examination.—Patient was a well-nourished female, aged fifty-two. Temperature 99 F. Pulse 80, character good. Respiration 20. Blood pressure 178/140.

Head.—No scars or deformities.

Ears.—No discharge or mastoid tenderness. Hearing normal.

Eyes.—Pupils equal. React to light and accommodation. No ptosis or strabismus.

Mouth.—Throat essentially negative.

Neck.—No pulsating vessels. No adenopathy. Thyroid palpable, but not enlarged.

Chest.—Expansion good and equal. No areas of dulness. No increased tactile or vocal fremitus. No râles heard.

Heart.—Right border midsternum apex beat, eleventh rib 2

cm. outside midclavicular line. No friction rub. No murmurs heard.

Abdomen.—Tympanitic. There was a tumor mass in the left hypochondriac and umbilical regions, which extended back into the lumbar region. The mass was not respiratory mobile. It was tender on deep pressure. The liver and spleen were not palpable. There were no hernias or inguinal adenopathy.

Extremities.—There were no varicosites. Knee jerk was not elicited. There were no pathologic reflexes.

Tentative Diagnosis.—Right renal or ureteral calculus.

Patient was referred to Dr. A. B. Hepler for urological study.

Urological Examination.—The patient was referred for (1) severe, colicky pain in the right lower quadrant. (2) Nausea and vomiting and nycturia two times.

Examination.—*Abdominal Palpation.*—There was some muscle splinting and lumbocostal tenderness on the left side. A small tumor was palpable in the left hypochondrium. It was not movable on respiration and there was no abdominal pulsation.

Urinalysis.—Specific gravity 1.020. Albumin two plus. Negative for sugar, a few pus cells. Bacteria none. Phthalein first hour, 4.4 per cent. Second hour, 19 per cent. Total two hour, 23.4 per cent.

x-Ray Findings.—Plain *x*-ray picture showed no definite evidence of ureteral or renal calculus in the region of the left kidney. There was a long, dense, mottled shadow in the region of the left kidney, evidently due to calcium deposit. This shadow overlay the kidney, but apparently extended a little below and a little above the outline of the kidney shadow. It was, therefore, extrarenal.

Renal Study.—A No. 24 F. cystoscope passed easily to the bladder. Residual urine, none. Bladder capacity, 500 cc. Bladder mucosa, normal. Ureteral orifices: normal in position and appearance. Number 6 F. catheters passed to both kidney pelves with no obstruction. Urinary flow of normal rhythm. Urines from both sides clear and negative except for an occasional pus cell. Indigo carmine, injected intravenously, appeared on

the left side in four minutes and on the right in four and one half. Concentration equal and good.

Pyeloureterograms, taken in the recumbent and upright positions, showed displacement and rotation on its transverse axis of the left kidney. The pelvis and calices were normal in outline. The calcification, noted in the plain *x*-ray plate, was shown to be definitely extrarenal.

Because of the extrarenal calcification, the palpable mass and the evident displacement of the left kidney without any disturbance of its function or change in the pyeloureterogram, a tentative diagnosis was made of (1) extrarenal tumor, (2) calcified solitary cyst.

Following the renal study palpation showed that the mass was rapidly increasing in size and the possibility of hemorrhage into a tumor was discussed. Operation was decided upon with findings as noted.

Operation (4/11/27): *Preoperative diagnosis:* External tumor (left); possible calcified solitary cyst of left kidney.

Postoperative Diagnosis.—Retrorenal hematoma. Cause unknown.

The left kidney was exposed by an oblique lumbar incision, paralleling the left rib. There was a large hematoma behind the kidney, traced to a tumor mass involving the abdominal aorta a little above the level of the origin of the left renal artery. The kidney was normal. The wound was closed in the usual manner, a rubber glove having been inserted for drainage.

Postoperative Course.—Twenty-four hours after operation patient complained of a severe pain in the left groin and suddenly collapsed. Pulse became weak and thready and five hours later she died with all the signs of severe hemorrhage.

Autopsy showed a large sacculated aneurysm of the abdominal aorta at the level of the left renal artery. The walls were thin and there was a small perforation on the outer upper aspect. The entire left lumbar space was filled with a large blood clot. The aorta was covered with atheromatous plaques and there were signs of a generalized arteriosclerosis.

Comment.—This case is interesting because of the rarity of

aneurysms of the abdominal aorta and because of the symptoms, which were rather typical of a right ureteral calculus. The hemorrhage, however, was into the left renal space and produced a displacement of the left kidney. The diagnosis of hemorrhage into an extrarenal tumor or into a calcified solitary cyst was made, but an aneurysm was not suspected.